

# CANADIAN PUBLIC HEALTH JOURNAL

DEVOTED TO PREVENTIVE MEDICINE

VOLUME 27

November, 1936

NUMBER 11

**Staphylococcus Toxin, Toxoid, and Antitoxin**

C. E. DOLMAN and J. S. KITCHING

**Control of the Efficiency of Pasteurization:  
The Phosphatase Test**

H. D. KAY

**Co-ordination of Medical Practice  
with Public Health**

F. W. JACKSON

M. R. BOW

R. O. DAVISON

**Survey of Pasteurization in Canada**

R. H. MURRAY

**Ensuring the Safety of BCG Vaccine**

ARMAND FRAPPIER and VICTORIEN FREDETTE

**B. Alkalescens (Andrewes)**

M. H. BROWN and E. A. ANDERSON

PUBLISHED MONTHLY BY THE  
Canadian Public Health Association

105 BOND STREET, TORONTO, ONTARIO

# FIFTH ANNUAL CHRISTMAS MEETING

LABORATORY SECTION

Canadian Public Health Association

ROYAL YORK HOTEL, TORONTO

MONDAY AFTERNOON AND TUESDAY

DECEMBER 21 AND 22, 1936

•

## THREE GENERAL SESSIONS

Offering opportunities for the presentation of papers in all fields of bacteriology (medical, dairy, food, water and sewage), immunology, parasitology, chemistry and pathology in relation to public health.

•

## DEMONSTRATIONS

•

*Titles of papers or demonstrations should be submitted to the Chairman of the Section, Dr. J. H. Orr, Canadian Public Health Association, 105 Bond Street, Toronto, not later than December 1st. The time allowed for papers is fifteen minutes; for demonstrations, ten minutes.*

---







# CANADIAN PUBLIC HEALTH JOURNAL

VOL. 27, NO. 11



NOVEMBER, 1936

## Staphylococcus Toxin, Toxoid, and Antitoxin

C. E. DOLMAN, M.B., B.S., M.R.C.P., D.P.H. Ph.D.,

AND J. S. KITCHING, B.A., M.D., D.P.H.

*Connaught Laboratories, University of Toronto*

**I**N 1928 a disaster occurred in Bundaberg, Australia, which resulted in the death within 15-34 hours of 12 children out of 21 injected with diphtheria toxin antitoxin mixture, which was subsequently proved to have been contaminated with staphylococci. The report of the Royal Commission of Investigation (1) concluded that the fatalities were due to the injection of living toxigenic staphylococci.

The toxicity of staphylococcal filtrates was first demonstrated towards the end of the last century, when certain staphylococcal bouillon cultures or their filtrates were shown to cause degenerative changes in the leucocytes of the rabbit(2). Soon after it was observed (3) that rabbits developed specific anti-leucocidic properties in their blood serum after a series of increasing subcutaneous injections of filtered bouillon cultures of staphylococcus pyogenes. The necrotizing effect (4) of staphylococcal filtrates on the skin and subcutaneous tissues of laboratory animals, as well as the lethal effect following parenteral injection of such filtrates into animals, was described. Attention was drawn to the fact (5) that certain staphylococcal cultures contained a haemolysin, to whose action the erythrocytes of different animal species showed marked variations in susceptibility. In 1900 (6) an antistaphylolysin was discovered in human blood which specifically neutralized staphylococcus haemolysin.

Little recognition was given to these early observations, but the revival of interest in the toxicity of staphylococcus filtrates following the Bundaberg disaster has led to their confirmation. Recent interest in this field has centered upon the possible relationship of these findings to problems of resistance and susceptibility to staphylococcal infection. The presence of a plasma-coagulating

substance in staphylococcal filtrates and cultures (7) has more recently been noted, and also a substance (8) (9) which gives rise, on ingestion, to acute gastro-enteritis in human beings and monkeys. This last substance, to which the term enterotoxin is now commonly applied, is produced by relatively few strains of staphylococci, and seems to be distinct from the above-mentioned substances.

In the preparation of staphylococcus toxin, suitable strains of staphylococcus are grown in a nutrient broth medium for from 4 to 6 hours at 37°C. Small amounts of these actively-growing cultures are added to Petri dishes containing a semi-solid agar medium to which 1 per cent peptone has been added; the plates are then incubated in an atmosphere of 20-30 per cent CO<sub>2</sub> and 80-70 per cent O<sub>2</sub> at 37°C. At the end of approximately 44 hours the growth products in the Petri dishes are filtered. The filtrate contains the toxin (10). When so prepared the dermonecrotic, lethal and haemolytic properties of staphylococcus toxin appear to be closely allied, at least quantitatively, and for practical purposes the *in vitro* assay of the haemolysin content of staphylococcal filtrates may be taken as a sufficiently accurate index of their exotoxin content.

The great majority of human pathogenic strains of staphylococci are definitely toxigenic under appropriate *in vitro* conditions of growth. Further, toxigenic strains may be isolated elsewhere than from human staphylococcal infections. Strains of staphylococcus obtained from apparently healthy mucous membranes of the nose and throat may prove extremely toxigenic when grown *in vitro*. There is evidence that toxin is also produced under suitable *in vivo* conditions, with consequent deleterious effects upon the host.

#### STAPHYLOCOCCUS TOXOID

The highly toxigenic properties of many strains of staphylococcus, alluded to above, are believed to account for many of the pathologic changes which characterize localized staphylococcal infections in human beings. Upon this belief (supported by a considerable body of laboratory evidence) is founded the practice of active immunization against staphylococcal infections by means of an antigen prepared from staphylococcus toxin.

Burnet (11) recorded that staphylococcus toxin could be detoxicated by the addition of formaldehyde and yet remain antigenic, and the toxin is therefore in this respect similar to diphtheria and tetanus toxins. The detoxicated material is innocuous but retains the ability to provoke specific antibody formation. As a result of these investigations, initiated and first reported in Canada (12), sufficient laboratory and clinical data have been collected during the past few years to prove the value of this antigen (staphylococcus toxoid) in the treatment and prophylaxis of localized staphylococcal infections. Definite standards of minimum potency for staphylococcus toxin before formalinization have been adopted, and, before release, the final product must be of proved innocuity and must satisfy certain tests for ensuring good antigenic power (26).

In a review of over 300 cases of localized staphylococcus infection Dolman

(12) (13) analysed the effectiveness of toxoid therapy. Excellent results were obtained in 81 patients with recurring furunculosis, many of whom had proved intractable to various treatments including vaccines. Encouraging results in 59 cases of chronic or subacute osteomyelitis and 42 cases with acne vulgaris were also obtained. In the case of acne vulgaris, it was pointed out that improvement manifested itself best in those cases showing pustulation, associated with the presence of staphylococcus, while those cases in which pustulation was absent benefited least. Active antitoxic immunity was with advantage provoked by means of toxoid in 40 cases convalescing from acute staphylococcal infections and toxæmias. The acquisition of clinical immunity could be correlated with an increased staphylococcus antitoxin titre of the serum; and in general a return of infection occurred only after there had been a considerable fall in the titre of circulating antitoxin. Attention was directed to staphylococcal infections of the throat, nose and accessory nasal sinuses, and it was pointed out that in many refractory cases of recurrent boils the possibility of auto-inoculation by staphylococci, from the nose especially, should not be overlooked. Whitby (14), reported good results with staphylococcus toxoid in over 100 cases of localized staphylococcal infection. A tenfold increase in circulating staphylococcus antitoxin was aimed at. Murray (15), in a detailed study, summarized the effect of toxoid therapy in 116 cases of localized staphylococcal infection. Of the total, 51 recovered completely, improvement occurred in 56 and there was slight or no benefit noted in 9. The series included cases of acne, blepharitis, furunculosis, carbuncle and other less common staphylococcal infections. Coincident with clinical improvement, there was an increase of circulating staphylococcus antitoxin in the blood due to the antigenic stimulus provided by the toxoid. The best results were obtained in cases of furunculosis, while fewer cures were obtained with the group suffering from acne. Gilchrist and Wilson (16), reviewing a large series of cases, showed the usefulness of toxoid in the treatment of chronic staphylococcal infections of the upper respiratory tract, especially in the prevention of periodic recrudescence of sinusitis. Connor (17) reported satisfactory results with the use of toxoid in localized staphylococcal conditions, especially in cases of sycosis barba. Twelve out of 23 cases of sycosis to whom toxoid was administered were cured, while the remainder showed improvement.

#### *Indications for Use of Staphylococcus Toxoid*

Staphylococcus toxoid is recommended for the treatment and prevention of recurrent styes, boils or carbuncles; pustular acne, particularly when associated with furunculosis; recurrent migratory staphylococcal abscesses of soft tissues and bone; staphylococcal infection of accessory nasal sinuses (i.e., sinusitis in which the staphylococcus is persistently found as the predominant micro-organism); and the product may be used in other less common types of localized staphylococcal infection as well as in convalescence from staphylococcal osteomyelitis. Since staphylococcus toxoid is a specific antigen, however, it cannot be expected to have any beneficial effect upon infections which are

unrelated to the staphylococcus. No deleterious effects result from beginning a course of immunization with staphylococcus toxoid in the presence of an active staphylococcal infection such as a boil, but the product should not be used in severely acute or generalized infections.

### *Dosage*

A series of doses which has proved efficacious is as follows\*: first dose, 0.05 cc.; subsequent doses—0.10 cc.; 0.15 cc., 0.20 cc., 0.25 cc., 0.30 cc., 0.40 cc., and 0.50 cc. Doses may be increased to 1 cc. when somewhat larger doses are found to be necessary as happens in very resistant cases. Alternatively in such cases a second course of from four to six injections may be given after a month or two have elapsed following the first course of eight. The initial dose of the second course should not exceed 0.05 cc., but if it is well tolerated subsequent increments may be slightly greater than those recommended for the first course. When it is particularly desired to avoid even the moderate local reactions referred to below, doses of 0.01 cc. and 0.02 cc. may be given at first. The smaller doses of toxoid may, with advantage, be given diluted with sterile saline, a small vial of which accompanies each vial of toxoid. Injections of staphylococcus toxoid should be given subcutaneously with an interval of from five to seven days between doses. Local redness, tenderness and swelling of the arm the day following the injection of staphylococcus toxoid are usual, but the discomfort is seldom disturbing. Slight malaise with headache, dizziness and nausea are occasionally noted on the day following the injection. More serious reactions accompanied by an increased temperature rarely occur and need occasion no alarm.

The usual response to a course of toxoid injections is an increase of from five to tenfold in the amount of circulating staphylococcus antitoxin in the blood. The duration of this induced immunity varies with the subject and the local condition. Frequent and intensive association of staphylococci with the host presumably tends to break down the degree of acquired immunity, and where a chronic focus of staphylococcal infection persists, a particularly high titre of circulating antitoxin is required in order to gain and maintain clinical immunity. This can usually be accomplished with perseverance in treatment provided that proper procedures be taken to eradicate chronic foci.

### STAPHYLOCOCCUS ANTITOXIN

The pathogenicity of the staphylococcus is attributed largely to the toxins which are known to be produced *in vivo* (11) as well as *in vitro*. The pathologic effects of toxin liberated by staphylococci in the presence of acute staphylococcal infections should be appreciated.

Dolman (18) has described in some detail the pathological changes produced by staphylococcus toxin, and summarized them thus:

Injection into a variety of laboratory animals of potent staphylococcus toxin leads to very rapid death, the characteristic micropathology being generalized capillary haemorrhages.

\*The dosage of staphylococcus toxoid referred to is that recommended in the use of the Connaught Laboratories' product.

These haemorrhages presumably lead to degenerative changes in the cells of vital organs, whose function may later be still further impaired through direct damage wrought upon them by the toxin. Strictly speaking then the toxin may be referred to as an endothelial poison, but the possibility should not be overlooked that the action of staphylococcus toxin upon the capillary endothelium may be to some extent secondary to a paralysis of sympathetic nerves and nerve endings. In animals injected intravenously with a fatal dose of toxin, the constrictor action upon the coronary arteries of the heart and the immediate fall in blood pressure, the pupillary changes and erection of the hairs, the hypermotility of the gastro-intestinal tract with ultimate incontinence of urine and faeces, and the generalized capillary and arteriolar dilatation which accompanies and probably precedes the haemorrhages, all contribute to render this suggestion plausible.

Staphylococcus antitoxin is a preparation of refined and concentrated globulins from the blood serum of horses which have been highly immunized against pooled toxoids and toxins obtained from several selected strains of staphylococcus. The antitoxin possesses to a marked degree the power to neutralize the pathogenic effects of staphylococcus toxin on the cells and tissues of laboratory animals, including the haemolytic, dermo-necrotic, lethal, and leucocidic factors contained in staphylococcal filtrates. Further, the passive immunization of animals with antitoxin can delay and in many cases prevent death following massive intravenous doses of living virulent staphylococci (19) (20) (21) (27).

During the past 5 years a considerable amount of clinical data has been collected dealing with the usefulness of staphylococcus antitoxin in the treatment of acute staphylococcal infections. Panton, Valentine and Dix (22) summarized the value of staphylococcus antitoxin in the treatment of 13 human cases of acute staphylococcal infection. In 5 cases of generalized infection, definite improvement was noted following antitoxin therapy, while in 3 fulminating cases no beneficial effect could be seen. The effect of antitoxin upon 5 cases of acute carbuncle was indefinite. Gross (23), without clinical details, emphasized the importance of antitoxic serum in acute staphylococcal infections and toxæmias. Dolman (24) reviewed the clinical effect of staphylococcus antitoxin administered to 104 patients suffering from acute staphylococcal infections, both with and without septicaemia. Of 24 patients with various types of acute staphylococcal infection of the skin and subcutaneous tissues, all made rapid recoveries following serum therapy. Of 32 severe cases of osteomyelitis accompanied by a positive blood culture, 22 cases recovered after the administration of antitoxin, while 5 of 22 apparently hopeless cases of staphylococcal septicaemia in adults and adolescents survived following intensive antitoxin treatment. It was observed that clinical improvement seemed to date in many serious cases from the time when the amount of circulating staphylococcus antitoxin in the blood stream had reached a maximum high value. Recently Joyner and Smith (28) have published encouraging results from the use of staphylococcus antitoxin. Of 16 patients with acute osteomyelitis and staphylococcaemia treated by prompt drainage and multiple blood transfusion, 8 died. Of 13 patients with the same type of infection treated by the same method, supplemented by the administration of staphylococcus antitoxin, only 2 died, and 11 recovered.

*Indications For Use of Staphylococcus Antitoxin*

The early use of staphylococcus antitoxin is indicated in the treatment of acute and generalized staphylococcal infections such as carbuncle, cellulitis, osteomyelitis, brain abscess, meningitis and septicaemia, where there is evidence—either bacteriologically demonstrated or at least strongly presumptive—that staphylococcus is the causal micro-organism. The main essential in staphylococcus antitoxin therapy, as indeed in any serum therapy, is that the serum must be administered early in the disease. The therapeutic action of the serum is primarily antitoxic in nature and is only indirectly antibacterial. The antitoxin possesses definite anti-leucocidic properties and may be expected *in vivo*, as *in vitro*, to neutralize the destructive action of staphylococcus toxin on leucocytes, so that the mechanism of the phagocytosis is thus enhanced.

Staphylococcus antitoxin is not recommended for the obviously moribund case, and no good results are to be expected from serum therapy under such circumstances. The limitations of antitoxin therapy in acute staphylococcal infections and toxæmias should be appreciated. In contrast to diphtheria, for example, in which the infection tends to remain localized, and in which the resulting toxæmia may be overcome by the judicious early use of specific antitoxin, acute staphylococcal infections often tend to become generalized. Toxin may therefore be formed at many sites simultaneously, and irreparable damage may be done to vital organs by the rapidly produced and rapidly acting staphylococcus toxin, which no subsequent excess of antitoxin can undo.

*Dosage*

Each case of acute staphylococcal infection presents an individual problem and no set dosage can be laid down. Of necessity, cases complicated by generalized blood stream infection require more antitoxin than uncomplicated cases, while the degree of toxicity, the age, and the relative sensitivity to horse serum of the patient must be taken into consideration. Doses\* ranging from 15 to 30 cc. may be administered intramuscularly without undue discomfort to the patient. Desensitization of all cases by several small subcutaneous or intramuscular injections should be previously carried out before the administration of the larger amounts. Staphylococcus antitoxin may be administered intravenously in a saline or glucose and saline drip in severe cases of staphylococcal septicaemia in which it is important to attain a high titre of circulating antitoxin as soon as possible, provided there are no signs or symptoms of severely damaged heart muscle or of broncho-pneumonia. The antitoxin should not be administered intravenously in those cases in which there is hyperpyrexia; and whenever administered by this route, should be given *very slowly*. In cases of staphylococcal meningitis, antitoxin may be administered by the intrathecal route in amounts of 15 to 30 cc., care being taken to remove an amount of

\*The dosage of staphylococcus antitoxin is that recommended in the use of the Connaught Laboratories' product. Since the adoption of the International Standard Unit of Staphylococcus Antitoxin (25), the potency has been expressed in terms of this unit. One cc. of such standardized preparations contains between 300 and 600 standard units, and the antitoxin is dispensed in 5,000 and 10,000 unit containers.



cerebrospinal fluid slightly in excess of the volume of antitoxin to be given subsequently. Doses should be repeated daily, if necessary, until the patient's general condition shows consistent improvement.

Thermal reactions frequently follow administration of staphylococcus antitoxin by any route in from 20 minutes to 1 hour, and are characterized by rapid rise in temperature, chilliness, and possibly dyspnoea. The treatment of thermal reactions is symptomatic. Serum sickness characterized by urticaria, fever and joint pains may occur within 5 to 14 days after the administration of antitoxin. Serum reactions may be relieved by the hypodermic injection of 0.5 cc. of epinephrine (1:1000 dilution).

In conclusion, mention may be made of the importance of staphylococcus toxoid as an active immunizing agent in cases of acute staphylococcal infection treated with antitoxin, as a means of maintaining antitoxin immunity following subsidence of the acute symptoms.

Opportunity is taken here to thank Professor D. T. Fraser for many helpful suggestions in the preparation of this paper.

## REFERENCES

1. Report of the Royal Commission of Inquiry into Fatalities at Bundaberg, 1928.
2. Van de Velde, H.: *La Cellule*, 1894, **10**: 403.
3. Denys, J., and Van de Velde, H.: *La Cellule*, 1895, **11**: 359.
4. von Lingselsheim, W.: *Beitr. z. exp. Ther.*, 1900, **1**: 49.
5. Kraus, R., and Clairmont, P.: *Wien. Klin. Woch.*, 1900, **13**: 49.
6. Neisser, M.: *Wien. Klin. Woch.*, 1900, **13**: 2234.
7. Gross, H.: *Zschr. f. Imm. Forsch.*, 1931, **73**: 14.
8. Dack, G. M., Cary, W. E., Woolpert, O., and Wiggers, H.: *J. Prev. Med.*, 1930, **4**: 167.
9. Dolman, C. E.: *J. Inf. Dis.*, 1934, **55**: 172.
10. Dolman, C. E.: *Canad. Pub. Health J.*, 1932, **23**: 125.
11. Burnet, F. M.: *J. Path. and Bact.*, 1929, **32**: 717.
12. Dolman, C. E.: *J.A.M.A.*, 1933, **100**: 1007.
13. Dolman, C. E.: *Lancet*, 1935, **228**: 306.
14. Whitby, L. E. H.: *Lancet*, 1934, **2**: 779.
15. Murray, D. S.: *Lancet*, 1935, **1**: 303.
16. Gilchrist, J. A., and Wilson, M. J., *Canad. Med. Assoc. J.*, 1935, **33**: 292.
17. Connor, J. I.: *Brit. Med. J.*, 1935, **2**: 1195.
18. Dolman, C. E.: Ph.D. thesis accepted by the University of London, 1935.
19. Gross, H.: *Wien. Klin. Woch.*, 1929, **8**: 1079.
20. Parish, H. J., and Clark, W. H. M.: *J. Path. and Bact.*, 1932, **35**: 251.
21. Combesco, D., et al.: *Compt. rend. Soc. de Biol.*, 1936, **121**: 177.
22. Pantan, P. N., Valentine, F. C. O., and Dix, V. O.: *Lancet*, 1931, **221**: 1180.
23. Gross, H.: *Zeit. f. Immunitäts. u. exp. ther.*, 1931, **73**: 14.
24. Dolman, C. E.: *Canad. Med. Assoc. J.*, 1934, **30**: 601; **31**: 1, 130.
25. Hartley, P., and Llewellyn Smith, M.: League of Nations, Quarterly Bulletin of the Health Organization, *Biolog. Standard*, Geneva, Jan. 1935.
26. Dolman, C. E., and Kitching, J. S.: *J. Path. and Bact.*, 1935, **41**: 137.
27. Kitching, J. S., and Farrell, L. N.: *Am. J. Hyg.*, 1936, **24**: 268.
28. Joyner, A. L., and Smith, D. T.: *Surg., Gynec. & Obst.*, 1936, **63**: 1.

# Co-ordination of Medical Practice with Public Health in Manitoba, Saskatchewan, and Alberta\*

## The Outlook in Health Preservation through Properly Supervised Medical Service

F. W. JACKSON, M.D., D.P.H.

*Deputy Minister of Health and Public Welfare for the Province of Manitoba,  
Winnipeg*

I SHOULD like to quote from an editorial in the *Western School Journal* of May of this year. This editorial was written by one of Manitoba's most prominent educationalists and followed the publication of an article written by Dr. D. A. Stewart entitled "Sound Bodies". The quotation is as follows:

"In his paper, Dr. Stewart appeals to teachers, parents, trustees, to practically everybody, but why does he not single out for special consideration the body which is supposed to act as guardian of health in the province, which has all authority in the training and licensing of physicians, and in making regulations to govern practice? We refer to the medical profession. If there is neglect in homes or failure to protect life in the schools, how much is the profession, as such, doing to remedy matters? There are areas almost 50 to 100 miles without the services of a physician, and not even the services of a qualified nurse are available. The profession has ensured its own security but has not provided service to all the people.

"The two sides to medical services are prevention and cure of physical (and should we not add mental?) ills. It is most absurd to think that homes and schools without personal direction from those legally authorized to advise in such matters shall do all the preventive work, leaving curative work or emergency treatment to the physicians. As a matter of fact there are hundreds who never see a physician until too late. The medical profession, with all its planning for lengthened training and for protection against shams and quacks, has failed to meet its great obligation. It should reach all the people (1) through visitation; (2) through widely distributed authoritative information; (3) through direction of home and school life in all such matters as are referred to in Dr. Stewart's able article. There should not be a district in which a doctor cannot be found, and in which nurses are not available. If that is not possible then let us have some form of state medicine so that every home and every school may have some one as authority who can advise and assist."

Surely this is a statement which must cause all of us to pause and think and ask ourselves, "Are we doing our part in trying to rectify matters?"

It is an impossibility for the meagre public health forces in Canada to reach every individual in our country and, to my mind, it is only in this way that the full application of our health knowledge can be made to bear the fruit

*\*Symposium presented at a joint session of the Canadian Public Health Association, the American Public Health Association (Western Branch), the State and Provincial Health Authorities of North America, the Canadian Tuberculosis Association, and the British Columbia Public Health Association, Vancouver, B.C., June, 1936.*

it should. Nor should we expect the state to provide us with the necessary personnel to carry out all the programs which we have in mind and which we know would greatly improve the individual and community health. Anyone who has had the misfortune or good fortune to spend some part of his life as a general practitioner, knows that the family doctor has an entry into the home that the ordinary health officer can never get. Why not then direct our efforts to a closer alliance with the practising physicians and let them be our emissaries of good health?

The more one sees of medicine, the more one becomes convinced that if it is to survive and destroy quackery, a new policy must be followed. This we think can best be obtained by the co-ordination of the practice of medicine with public health activities.

Our greatest health educator in Manitoba has been the travelling chest clinic, "going out," as Dr. Stewart so aptly puts it, "on to the highways and into the byways searching out disease." This clinic has always operated through and with the consent of the practising profession and has done more than any other single activity to make the individual, the community, and the medical profession health conscious.

In Manitoba we have had no experience with the travelling eye, ear and nose clinic provided by the state, but for outlying districts we think they should have real value. All our efforts in this connection have been in arranging for the clinics and then turning over the actual operation to organized medicine, usually through the nearest practising specialist. In all instances, however, we have supplied a public health nurse to assist. The regular procedure is as follows: Some local community organization such as the United Farm Women or the Women's Institute, writes suggesting that a great number of children in a district are in need of glasses, let us say. We suggest a clinic might be held and that we are prepared to send a public health nurse to ascertain the need. The nurse, as well as reporting to headquarters, reports to the local organization and when we are informed that a clinic is advisable and desired, the sponsoring organization is referred either directly to the nearest specialist or to the appropriate section of the Manitoba Medical Association, and the financial arrangement for the clinic is a direct contract between the two parties concerned. Our nurse, of course, attends the clinic to assist and sends a report to headquarters.

One may ask: "But why should such community organizations take such an interest in health?" We feel that it is our business to keep these groups health-minded. During the last winter some seventy-seven local branches of the Women's Institute put on a series of five health projects. The material for these was prepared by the Department and sent to the individual units on request at stated intervals; women of the local group, chosen by the group themselves, prepared the addresses from the material supplied, and submitted them to the whole group at the appointed times. In June the United Farmers of Manitoba had just completed a chautauqua tour taking in eleven points throughout the province; on each program there was a medical speaker. The request from the parent organization came to the Department, and at the

suggestion of the Minister the College of Physicians and Surgeons of Manitoba was asked to supply the speakers. The College selected some of the outstanding men in the profession in Manitoba to carry out the program and voluntarily assumed all the expense. We cannot thank them enough. We feel that to have organized medicine take over a health project such as this, is a real advance in public health.

We cannot speak of clinics without mentioning dental clinics. During the past four years, 255 such clinics have been held with a total attendance of 8,736. This splendid piece of work has been made possible through the generosity of the Manitoba Division, Canadian Foundation of Preventive Dentistry, and the Canadian Dental Hygiene Council. I do not know of any better organized piece of real health work anywhere. All that the Department has to do is refer the requests for clinics to the dental committee and supply the nurse for the clinic. It is just as simple as that. The real advantage is that all the clinics are held where no dental facilities are available, and although the initial clinic is usually free, subsequent ones are on a self-supporting basis. We trust that the two organizations may long continue to carry on this good work.

We have had some experience in Manitoba with municipal doctors and we believe they carry on in health preservation very well. Although this service is established for the purpose of supplying medical care when required, we find that the doctor soon begins to think and work towards prevention, as he reasons that this is bound to react to his benefit in lessened calls for actual illness. Thus we find communicable disease reduced to the minimum in these areas, and vaccination and diphtheria toxoid administration practically complete. We expect in the near future that all our municipal physicians will be specially trained in public health. Already two are, with another taking the course leading to the Diploma in Public Health this year. This is made possible by the generosity of the Rockefeller Foundation and Connaught Laboratories, University of Toronto, in the provision of fellowships.

Toxoid administration in our province, with the exception of Winnipeg and our three health units, is carried out entirely by the practising profession. During the past four years toxoid has been administered to 83,720 persons; in other words, over 12 per cent of our population. In 1935, 33,000 complete immunizations were given. This is twice the number of births in Manitoba and although at the present time our toll from diphtheria is far too high, yet we think we see the end of the road. The percentage of pre-school children protected increases each year, and soon this will be the only group requiring immunization. To make the administration of diphtheria toxoid uniform and in order that we may have some details in reference to the number, ages, etc., of those immunized, we have made it a rule (sometimes broken, however) that there must be a public health nurse present at all municipal and school programs. All our nurses have been given special instruction in technique and each is supplied with syringes, needles and sterilizing outfits, so that all the physician has to take to the clinic is his hands, and the nurse has the necessary equipment to see that these can be made sterile. We believe that a uniform

recognized method of toxoid administration is desirable and tends to reduce to the minimum the possibility of untoward results.

All that we have so far discussed deals with more or less specific efforts. What about a real co-ordination of all medical practice under public health supervision and control? This is in operation in Manitoba amongst the unemployed of Greater Winnipeg, a group of some 40,000 people who receive a complete medical service from the physicians of their own choice under the direct supervision of the public health personnel of the city and suburbs. Fairly accurate statistics are kept and already these have been summarized for the first year's operation. The first part of the report has already been published in this JOURNAL\*. The second year's operations are now being summarized, and these reports will be published in due course.

It is impossible to go into any detail about this unique experiment, but briefly the scheme is this. The individual desiring medical attention for himself or any member of his family makes application to the Medical Relief Officer, naming the physician of his choice. The Medical Relief Officer has the right of determining whether or not such medical service is required. In case of emergency, the individual may call his own doctor directly and the doctor, before giving further service if such is required, gets permission from the Medical Relief Officer. The doctor, in order to collect his fee, is required to fill in certain forms similar to those in use by Workmen's Compensation Boards. In case of any dissatisfaction on the part of any one of the three persons, namely, the Medical Relief Officer, the patient, or the physician, appeal can be made to an advisory board which is entirely medical and consists of the Medical Officer of Health, the Medical Relief Officer, and the chairman and one other member of the Committee on Sociology of the Manitoba Medical Association. The decisions of the board are final. Should evidence indicate in any case that there may be a question of unethical conduct, etc., on the part of a physician, the matter is referred by the Medical Relief Officer on the advice of the Committee of Sociology of the Manitoba Medical Association to the College of Physicians and Surgeons for investigation.

The whole administration has functioned with exceeding smoothness, and to the satisfaction of the Relief Commission as evidenced by their chairman when he stated in public that "the medical profession has only rendered one type of service—the best".

Many striking things from a public health standpoint have already become apparent. Some of these are:

- (1) That many people in many instances demand and sometimes receive more medical attention than they actually require, or more than is good for them.
- (2) That a scheme of supervised medical services will, apparently, considerably reduce serious illnesses, particularly when the individual requiring medical care has free access to a doctor, as in these instances medical care is secured at the earliest possible moment before the individual becomes seriously ill.

\*Elliott, M. R., *Canad. Pub. Health J.*, 1936, 27:209.

(3) That the only effectual control of public medical services is medical control and this can quite satisfactorily be carried on by the official health personnel with the co-operation of organized medicine.

(4) That the general death rate can be materially reduced. Tentative figures for two years show that the yearly death rate in this group was 2.5. It must be remembered, however, that the oldest individual for this group is probably 60, and the death rate for the population of Manitoba under 60 is 4.3 (1934).

(5) That the morbidity and death hazards of childbirth can be decidedly curtailed. Amongst pregnant women in the unemployed group in Greater Winnipeg, the maternal mortality rate was 1.6 per 1,000 live births for the two years, there being approximately 2,000 births in the two years and three maternal deaths.

We give these figures because we think that they are at least suggestive. We realize, however, that the group is comparatively small and that two years is not a long enough period to give us an authentic figure.

Let us deal for a moment with the fourth and fifth items; namely, the apparent lowering of the general death and maternal mortality rates. Of course, we have to take into consideration many factors which may have played a part in these low rates. Firstly, none of the individuals in this group are subject to any industrial hazard; secondly, no one in this group had any particular physical or mental strain because the heads of the families were not working and knew that provision for themselves and their families was assured. However, despite these considerations, we feel fully convinced that these exceedingly satisfactory rates can at least be partially attributed to the following: that this medical service is medically supervised, through the City Health Department; that hospitalization is freely available to those who require it; and that operative procedure including that required in maternity care is restricted to that which is absolutely essential, and in most instances, if there is any doubt (and this particularly applies to childbirth) no operative procedure is allowed without consideration. As a matter of fact, in all cases treated under this scheme, consultation is freely used to decide whether or not the treatment or operative procedure suggested by the physician should be carried out.

Another point which should be of interest, particularly to the medical profession, is that this group do not have provided, nor do they buy, patent remedies or appliances, and no provision is made in the scheme for the calling of other than a qualified physician; possibly this also may have some bearing on the low mortality rate.

We must admit, of course, that this group hardly represents a fair cross-section of the average community, certainly not the average community in the Prairie provinces; and in order to confirm any points brought out in this survey it would appear imperative that a similar type of system be set up in certain selected areas. Then and only then can we definitely decide on the advan-



tages and disadvantages of a supervised system of state medical care. I know that Medicine, as a group, does not approve of the idea of supervision, claiming that a layman or group of laymen has not the requisite knowledge to know what is required in any given case. But I might suggest that no industry has the same claim to be classified as a public utility as has Medicine, for, after all, a proper system of medical care is essential to the well-being of humanity and the advance of civilization. In many places the state controls absolutely the operation of hospitals and in most others has a very real supervisory power exercised through the provision of grants. Public control of public utilities is here to stay and I venture to say that in all those industries so classified not only have the services rendered to the people been immeasurably improved, but the industries themselves have been put on a far more satisfactory financial basis. You may say: "Why, he advocates state medicine!" I do not claim to know enough about state medicine to be in a position to advocate it. The point which I wish to make is that it would appear that the medical profession is already being pushed into state medicine; and if state medicine is to be what it should, it is in my opinion absolutely imperative that any scheme should be under complete medical control in so far as the type, kinds of service to be given, and the method of providing such service are concerned, as our experience in Manitoba leads us to believe that the most benefit can accrue to the people from a proper medically supervised system of medical care. This medical supervision should be a joint effort of the state represented by the official health agency and organized medicine. A complete co-ordination of medical practice and public health, particularly with the advent of state medicine, should insure the utmost in good health for all our citizens.

One would say that the future holds for us in Western Canada a great opportunity to participate in the many experiments in the provision of state medical care, and organized public health should and must give its assistance in seeing that the greatest possible good comes from any scheme in operation; not only should we give our assistance, but if we are to protect our people, we must insist that we have very definite supervisory powers.

We are firmly convinced in Manitoba, both organized public health and organized medicine, that much is to be expected, from the standpoint of the profession, in the future from the various experiments now being carried on. And we feel sure that before there is any great demand for a province-wide scheme of health insurance, our ideas will be sufficiently well crystallized to permit us to present to the governing authorities some scheme which not only should be of benefit to the public at large, but should give due consideration to the necessities and rights of the medical profession.

This is a new birth of Medicine in Canada, and in the words of Sir George Newman:

"It means that in our day the science and art of medicine has arrived at a new position of immeasurable gain and advantage to our people as compared with the past. We can now become, if we will, fuller interpreters of Nature, the heralds and agents of powers of control of the body undreamed of by our forefathers."

## The Use of the Profession in Part-time Health Activities

R. O. DAVISON, M.D.

*Deputy Minister of Public Health for the Province of Saskatchewan, Regina*

IN discussing the subject, "Co-ordination of Medical Practice with Public Health," it will be obvious that I should confine my remarks to our experience in Saskatchewan in so far as the administration of public health programs is concerned. It would also appear to be necessary to determine how broad, how comprehensive, is our conception of public health. Unquestionably the field embraces vital statistics; the general sanitary condition of our environment; the control of communicable diseases, including venereal diseases; maternal and child welfare; mental hygiene, and education in the general principles of personal hygiene and public health.

No matter how broad may be the conception of the public health field entertained by administrative departments, there can be no doubt that governmental policies should be determined by the picture presented on our vital statistics records. This picture so clearly depicts the change that has occurred in our mortality rates whereby heart disease and cancer have superseded the communicable diseases as the greatest killers, that Saskatchewan, among other provinces and states, recognizes the necessity for definite action to deal with those diseases which usually manifest themselves in later adult life. While cancer may only require that our main efforts be directed toward persons approaching middle life, we know that any attempt at the control of heart disease comprises the whole field of our present endeavours whether it be the prevention and care of infective processes or attention to proper personal hygiene and habits of living throughout the whole life of the individual, or some procedure to detect the first signs of approaching disability.

In considering how dependent curative medicine is on preventive medicine and *vice versa*, it is very difficult to determine where one ends and the other begins; so difficult, indeed, that it is very doubtful if any phase of curative medicine is complete without a due regard to prevention, even though it may be only the immunization of contacts against a communicable disease or the necessary advice to ward off another manifestation of organic disease.

Experienced physicians are quite cognizant of the importance that can be attached to that factor represented by "the confidence of the patient in his doctor" in the care of the sick, and in any question relating to medicine or public health in general, the family physician is the family adviser. Irrespective of how much propaganda or educational work may be carried on respecting any public health measure, the expressed opinions of the medical advisers of the family units will have a definite bearing upon the effectiveness of the measure. Let me state here: I do not question the advisability of such a situation, but on the contrary I welcome it, realizing at the same time the necessity for a medical profession conversant and sympathetic with the enlargement of the scope of public health practice.

Administrators of health departments must and do recognize the fact that

practising physicians occupy the front-line trenches and are in the strategic position to ward off the attack of epidemic disease or give proper direction in those conditions which, in the main, only affect the individual. The practising physician in each case holds the key position.

The foregoing is not new: it is a repetition of what public health officers have long known; nevertheless the repetition may serve to emphasize the necessity for the wholehearted co-operation with the practising medical, dental and nursing professions in any program for the maintenance of a proper standard of the public health.

The problems of health administration in Saskatchewan, I assume, are similar to those in other provinces and states, and possibly are varied mainly by virtue of geographical and climatic conditions, and density or distribution of the population. Our population is approximately 1,000,000 persons, distributed over an area of about 400 miles north and south, by 400 miles east and west. There are eight cities, 81 towns and 381 villages in which reside 35 per cent of the total population. The other 65 per cent is largely occupied in agricultural pursuits and reside in 302 rural municipalities and unorganized local improvement districts.

Each urban and rural municipality has the right of self-government which includes the administration of the public health act and regulations. Each municipal council is a board of health and must appoint a qualified medical practitioner as medical health officer.

There are about 600 practising physicians in the province. It will be apparent, therefore, that the practising physicians must assume the appointments, provided for by law, as part-time medical health officers. It would appear that such a method of appointment must be continued for a long time to come and until some other plan is evolved, other than full-time health units, to take care of the problems involved.

In Saskatchewan our immunization campaigns against smallpox, diphtheria and scarlet fever do include and have included the practising physician. Our pre-school examination clinics, organized by our nursing staff, provide for the services of the local physician as the examiner. Our maternity grants policy now requires a pre-natal examination and report by the attending physician, and in addition a gratuity is added for a post-natal examination in each case.

The Anti-Tuberculosis League in its program for the prevention and treatment of tuberculosis works very closely with the medical profession, and its policy in the examination of contacts is planned so as to have the preliminary and follow-up examinations made by the family physicians. A specialist service is, of course, made available as required. Dr. R. G. Ferguson, Director of Medical Services and General Superintendent of the Saskatchewan Anti-Tuberculosis League, assures me that it would be impossible to carry out his program of searching for incipient and active cases among contacts of known cases without the co-operation of the medical profession.

In our cancer program, only cases which are referred by a physician as

suspected, or diagnosed, cancer cases are examined in our centralized clinics, and constant contact is maintained with the physician in following up the cancer patient after he has left the clinic.

### THE MUNICIPAL DOCTOR AND PUBLIC HEALTH

It is, perhaps, in the field of the municipal doctor that we may have the widest opportunity for public health work and perhaps the most effective way of co-ordinating the practice of medicine with public health.

Legislation has been in existence for nearly 20 years whereby a rural municipality might engage a physician to provide medical care to its residents. Originally designed to meet the needs of communities which had difficulty in persuading a physician to locate in them, it has gradually grown and has been improved so that to-day not a small portion of Saskatchewan is obtaining medical services by this means. As in any other movement of this nature, there are many good features and some that may require adjusting and improving. As it has been, each municipality and its physician was a unit by itself, with no relation to others. The salaries paid, the tenure of office, and the services to be rendered, depended upon each individual contract between the council and physician.

To-day there are 68 rural municipalities employing full-time municipal physicians and 60 other municipalities employing physicians on a part-time basis to render medical services to certain classes of their residents—especially indigents, etc. Probably one-fifth of the rural population receives medical services under this scheme, existing in the 68 rural municipalities.

In 1934 a Health Services Board was established with varied responsibilities of enquiry and certain duties of an advisory nature with reference to the municipal doctor system. The Rural Municipality Act was amended at the same time to require the approval of the Health Services Board to all contracts made with municipal doctors. However, the legislation did not give the required authority to the Board to make it effective nor was the personnel of the Board practicable, for the reason that it was made up of full-time administrative officials whose other duties required their full time. At the last session of the Legislature, however, the Minister of Public Health, the Hon. Dr. Urich, brought in amendments which changed the constitution of the Board and clothed it with authority to deal with the problems relating to municipal physicians, with a view to co-ordinating the units and obtaining data on sickness morbidity, costs involved, and regulating the services to be rendered, etc.

The old Board had already provided a model contract to guide municipalities and physicians, and we have endeavoured (and are continuing to do so) to have the contracts as uniform as possible. The new Board will be appointed shortly and the policies governing its administration will, without doubt, have a distinct bearing upon public health practice in our province.

You will see that the approval of contracts provides an excellent opportunity to have included those provisions which will adequately care for the

needs of the people so far as preventive medicine is concerned. You will see also that it is to the distinct advantage of the municipal doctor to carry out all the preventive medicine possible as it will necessarily lessen his burdens in curative medicine. Each model contract includes provision for holiday periods and attendance at medical society meetings, the organization of pre-school and immunization clinics and the medical inspection of all school children in the municipality once each year. Our experience demonstrates the value of this system in co-ordinating medical practice with public health, and while exact data could not be compiled in time for this paper, and in fact are not obtainable in any form that could be considered accurate, due to the lack of uniformity in services rendered and reports available, the Department is assured that a greater proportion of health work is being carried out in those rural areas served by municipal physicians than in others. This is not in any sense a criticism of physicians other than municipal, but is what one would expect in view of the nature of the contract under which the municipal doctor is employed.

It is quite true that under municipal practice certain conditions, associated with private practice, have been altered. The physician's income does not depend solely upon the amount of work his sick patients provide for him, and in fact the composite nature of his employment should even induce him to stray from those ultra conservative principles underlying medical practice and initiate measures to guide his patients and the community along the road to good health.

As stated previously, I am unable to present at this time comparative figures respecting preventive work done by municipal physicians and private practitioners, but in future such compilations will be conducted by the new Health Services Board. However, the Department distributes certain biological products free of charge, and this distribution, as shown in the accompanying table, provides some indication of the preventive work done.

TABLE I

DISTRIBUTION OF DIPHTHERIA TOXOID, SMALLPOX VACCINE, AND SCARLET FEVER TOXIN TO MUNICIPAL DOCTORS AND OTHER PHYSICIANS AND HOSPITALS, SASKATCHEWAN, 1934 AND 1935

	Diphtheria Toxoid		Smallpox Vaccine		Scarlet Fever Toxin	
	1934	1935	1934	1935	1934	1935
Municipal doctors.....	6,894	8,745	6,341	10,530	794	2,994
Other physicians and hospitals	23,368	18,868	18,169	18,755	4,520	5,470
Total.....	30,262	27,613	24,510	29,285	5,314	8,464
<i>Number that would have been treated by other physicians and hospitals based on the treatments distributed to municipal doctors</i>	62,046	78,705	57,069	94,770	7,146	26,946

## The Provision of Medical Clinics for the People by the Provincial Department of Health

MALCOLM R. BOW, M.D., D.P.H.

*Deputy Minister of Health for the Province of Alberta, Edmonton*

IN the province of Alberta the Provincial Department of Health provides the following clinics: tuberculosis, venereal disease, child hygiene, mental hygiene, and the travelling clinics. With the exception of the latter, the work of these clinics is conducted on much the same lines as in other provinces and it therefore is necessary only to mention some special features as developed in Alberta during recent years before outlining the work of the travelling clinics.

### *Early Detection of Neurosyphilis*

In the venereal disease clinics, following the policy inaugurated some ten years ago, we have directed particular attention to the early detection and treatment of neurosyphilis and cardiovascular syphilis, the two types which cause the greatest economic loss from incapacitation and early death. The following figures in connection with the work carried on in the Edmonton clinic will be of interest. To the end of 1935, the total number of spinal fluid tests was 613, of which 101 were positive. Of these 101 patients, 80 have received malarial pyrexia treatment to date. In all cases giving a positive Wassermann reaction, treatment is given for nine months before the spinal fluid tests are done. We believe that by this procedure we can find many potential cases of general paralysis of the insane and prevent their becoming total liabilities in so far as the state is concerned. Since 1925 facilities have been provided in the mental hospital at Ponoka for the malarial treatment of patients exhibiting the symptoms of general paralysis.

### *The Free Treatment of all Tuberculosis Cases*

This year a Tuberculosis Act was passed by the Legislature under which provision is made for free treatment of all residents of the province. Under the authority of the Act, provision has been made to extend the diagnostic service. With increased accommodation available and with increased facilities for diagnosis and the follow-up of contacts, our position in regard to this disease has been greatly improved.

### *A Nutrition Service*

A nutrition service was developed in connection with the child hygiene clinics, which operated in the province last year. Miss Malone, Chief Dietitian of the University Hospital, was attached to these clinics for a period of two months, giving lectures and demonstrations to mothers at each centre visited by the clinic. We believe this is a service of outstanding importance and one which should be developed under the direction of provincial departments of health.



*Sterilization*

In connection with the work of the mental hygiene clinics, any cases in which sterilization is considered advisable are referred by the clinic staff to the Eugenics Board. If the Board approves of the operation being performed, arrangements are made for the admission of such patients to the Provincial Mental Hospital at Ponoka, which is equipped as a surgical centre. During the year 1935, 220 cases (123 male and 97 female) were presented to and passed by the Eugenics Board, bringing the total number of cases presented and passed since 1929, when the Act went into effect, to 722 (342 male and 380 female). In 1935, 84 operations (33 male and 51 female) were performed, bringing the total operations to 395 (127 male and 268 female).

*Health Insurance Demonstration Districts*

One of the important recommendations of the Health Insurance Commission of Alberta was that demonstration districts should be set up under the Health Insurance Act, and that these should be operated for a period of years before any general application of a health insurance scheme was attempted over the whole province. There is little accurate information available in regard to the cost of sickness in this country. While, during the three years' study of health insurance by the Health Insurance Commission, data in regard to the costs of medical care were obtained from every available source, the Commission realized that much of the information obtained was not applicable to conditions in this province. For this reason the Commission recommended that demonstration districts should be established in representative areas of the province in order that full opportunity might be given to apply the measures for which provision is made in the Health Insurance Act and thus acquire accurate information concerning the cost of providing a complete medical service in Alberta.

Under the Health Insurance Act of Alberta provision is made for the establishment of a full-time preventive health service in each medical district established under the Act. The Commission strongly emphasized the importance of providing the full-time service through a thoroughly qualified public health staff available for dealing with the health problems of the rural districts and smaller urban centres, and stressed also the importance of co-ordination of this preventive service with the service of practising physicians, dentists and hospitals in providing complete medical care for the residents of each district established.

Owing to existing economic conditions, it has not been possible to proceed with the establishment of the demonstration medical districts to which I have made reference.

## THE TRAVELLING CLINIC

As the travelling clinic, as it is operated in the province of Alberta, is unique in many respects, a general outline of its organization and work will be given. The travelling clinic began its work in 1924 as a result of the requests

for various health services received from those residing in outlying districts where such services were not available. In isolated districts, far from railways, hospital and medical service, the work of the district nurses often presents problems the solution of which taxes their ingenuity. In such a contingency the travelling clinic was created.

Frequently in the course of their work the district nurses discover children in urgent need of medical, surgical or dental attention but, owing to the distance from hospital, physician and dentist and the expense involved, it is rarely possible to obtain such attention. With a view to attempting a solution of this problem, a plan of action was evolved. A number of cases were assembled at a central point, and a doctor invited to examine the patients and perform, at a special rate, the operations found necessary. This experimental work was repeated in 1925 and 1926. During these years some 22 clinics were held in outlying districts. In the fall of 1926 the experiment of placing the clinic on a partly self-supporting basis was tried and on the experience gained in operating these early clinics was based the policy of the travelling clinic as it is operated at the present time. During the winter of 1926 and 1927 requests for the services of the clinic became so numerous that thorough organization became necessary, as well as the development of an adequate plan of operation. Secretaries of school boards, women's organizations and other interested bodies were advised of the conditions under which the clinic would visit rural districts. From the beginning the practice has been followed of visiting only districts from which requests have been received from some responsible local organization for the service.

The Department requires that at least twelve school districts shall combine for clinic purposes and that a local committee shall be formed and become responsible for details in connection with the clinic, such as the obtaining of a suitable building, provision for water supply, heat, beds, bedding, etc. This local committee also acts in an advisory capacity.

When the year's itinerary has been planned, an experienced public nurse is sent by the Department to make a preliminary inspection of all school children in the district to be served and refers to the clinic all children who she considers should be examined by the physicians and dentists on the clinic staff. The local committee is then advised as to the date on which the clinic will arrive.

The personnel of the clinic staff during the summer of 1935 was as follows: a surgeon in charge, one physician assisting in medical examinations and acting as anaesthetist, two dentists, three graduate nurses and two truck drivers. Two trucks are utilized to transport the clinic equipment and one car is available for the transportation of the staff.

The staff of the clinic is carefully selected with a view to obtaining a staff that not only is thoroughly competent, but one that also possesses those personal qualities which are so important in work of this nature.

On the first day of the clinic the two doctors and one dentist are engaged

in the examination of patients, and parents are instructed to bring the children requiring operations back to the clinic on the following day. The second dentist carries on dental treatment, and the nurses take charge of the clerical work and the organization required. On the second day of the clinic one dentist continues with dental treatment and the rest of the staff is engaged in the operating room and improvised hospital ward. The second dentist remains in the operating room doing the extractions under general anaesthesia. The surgical staff consists of the surgeon, anaesthetist and surgical nurse. One nurse is in charge of the sterilization of instruments and supplies and the other nurse is in charge of the patients before and following operations. The truck drivers, who are either medical or dental students, assist in the operating room and in carrying patients. Patients who have been operated on remain until the following day in the improvised hospital, which may be located in a community hall or a rural school or whatever may be the most suitable building available.

On the third day the clinic moves to the next centre, the itinerary being arranged so that this is within easy access in the event that it may be necessary for the staff to visit any patient operated on at the previous centre.

The parents are present during the examination of the children and are invited to bring any pre-school children requiring attention to the clinic. The clinic offers an exceptional opportunity to impart health instruction to the parents, of which full advantage is taken.

The following are the outstanding features of the clinic:

Careful physical and dental examinations of school children.

Minor surgical operations, such as the removal of tonsils and adenoids, circumcision, etc.

Dentistry.

Vaccination of children against smallpox.

Health education—this by precept and example during the two-day period of intimate contact with parents and patients.

A charge of \$15.00 is made for tonsil and adenoid operations and a proportionate charge for other minor operations. The charge for extraction of teeth is from 50c to \$1.00 and for fillings from \$1.00 to \$2.00. No charge is made for services rendered by the travelling clinic where the financial circumstances of the parents are such that they are unable to pay for these services.

Where physicians are practising in proximity to districts visited by the clinic, they are notified in advance of the visit of the clinic and invited to co-operate in its work. Children examined at the clinic are referred to the family physician for such after treatment as is indicated.

Following the completion of the itinerary, a circular letter, with a progress report form attached, is sent to the parents of the children examined by the clinic staff. Parents are asked to complete these forms and return them to the Department. In this way it is possible to make an appraisal of the service, both from the health as well as the educational point of view.

The following is a brief summary of the work performed by the travelling clinic from its inception in 1924 to the end of 1935:

No. of clinics held .....	277
No. of children inspected by public health nurse preceding clinic ..	36,000
No. of school districts covered .....	2,185
No. of physical examinations by physicians .....	26,814
Total number of operations .....	7,553
No. of patients treated by dentist .....	8,836
No. of dental treatments .....	26,731

The cost of operating the travelling clinic in 1935 for the four and a half months it was in the field (May 1st to October 1st) was as follows:

Salaries .....	\$8,728.29
Travelling expenses and maintenance .....	6,208.38
Expenses .....	5,201.52
Total .....	\$20,138.19

Thirty-four centres were covered in the itinerary of 1935.

## TENTH ANNUAL CHRISTMAS SEAL SALE CANADIAN TUBERCULOSIS ASSOCIATION



THE tenth annual seal sale of the Canadian Tuberculosis Association is now in progress. During the past nine years the aggregate raised by these campaigns is well over a million dollars, the proceeds of which have been spent in the prevention of tuberculosis.

Just what a million dollars transmuted into tuberculosis preventive work has meant to Canada cannot easily be told.

During the past ten years there has been a reduction of more than 25 per cent in the death rate from that disease. The suffering prevented, the lives saved, the homes preserved unbroken, the endless chain of tragedies which follow tuberculosis snapped at its very first link, are but part of the benefits obtained. In this great preventive work the tiny Christmas seal has been a powerful weapon, and its value bespeaks for the future the continued enthusiasm and support manifested by the people of Canada in the past.

# Control of the Efficiency of Pasteurization of Milk: The Phosphatase Test

H. D. KAY

*National Institute for Research in Dairying, University of Reading, England*

THE value of pasteurization in rendering safe for human consumption milk which may have been contaminated by pathogenic organisms requires no emphasis in this JOURNAL. Nor need it be laboured that public health administration is deeply concerned that commercial pasteurization shall be carried out in such a way that the product reaching the home is in truth free from the possibility of conveying infection, and that the consumer is protected from inefficiency, carelessness or fraud.

"Pasteurization" as applied to milk has, however, not exactly the same connotation in different parts of the world, or even in different parts of the same country. In some countries the word may be strictly applied only to the low temperature (circa 63° C.) holder process; in other countries the high-temperature short-time process, in which milk is exposed for a period of only 10-20 seconds at 72-75° C., is legally recognized.

In Canada, as far as the present writer is aware, only the holder process of pasteurization is officially approved. The latest English regulations (1936) likewise insist on the holder process. The exact official requirements appear to vary somewhat from one Canadian province to another. In the Milk and Cream Act, 1927, Ontario permitted an exposure of the milk to 140° F. (60° C.) for 20 minutes to be regarded as pasteurization, but allowed a possible maximum exposure of 30 minutes at 150°. In the writer's opinion (based on the results of numerous tests in this Institute in which milk *naturally* infected with *M. tuberculosis* was used), an exposure of 20 minutes at 140° F. is dangerously low. The new regulations in Ontario require milk to be pasteurized at at least 143° for 30 minutes. The regulations of some of the other provinces are not before the writer, but there can be no doubt that the use of temperatures as low as 140° is to be deprecated. The most recently published official orders of the English Health Ministry (1) require a minimum exposure of 30 minutes to a temperature of 145° F. Unless the milk has been "retained at a temperature of not less than 145° F. and not more than 150° F. for at least 30 minutes and immediately cooled to a temperature of not more than 55° F." it cannot be properly designated as pasteurized. Serious penalties may follow, and under the efficient local authority do follow, if this order is disobeyed. Unfortunately, till quite recently it has been a matter of considerable difficulty, either for the responsible firm or for the health authority, to ascertain whether,

with any given plant or specimen of pasteurized milk, the minimum time and temperature requirements of legal pasteurization, with their virtual guarantee of destruction of all harmful organisms, have or have not been properly observed.

Errors of holder pasteurization are, in the main, in the direction of too low a temperature or too short a time of exposure. Both too long an exposure to heat and exposure to too high a temperature are avoided as far as possible in commercial practice owing to their deleterious effect on the "cream-line". Damage to the "cream-line" (as a result of such over-exposure) is a matter of importance to the milk salesman, though it is a relatively venial offence from the public health point of view. From the latter standpoint it is, of course, errors of *underexposure* which must be guarded against.

#### THE PHOSPHATASE TEST

The present article is limited to a brief description of a method (2) which has been recently devised for detecting with great certainty quite small errors in this latter direction. The method does not require the scrutiny of the plant used for pasteurization—a very highly skilled and time absorbing operation if small errors are to be detected\*—but merely involves a simple, laboratory examination of the *product*. This is, after all, the most logical way to determine the efficiency of a process. If faults are found the next step is the careful examination and improvement of the plant or the method of management. But until recently examination of the product was only possible by tests which either lacked precision or required an animal inoculation followed by six weeks or more of waiting before a pronouncement could be made.

The new method† depends essentially on the facts that milk is a biological fluid, and that like most biological fluids it contains various enzymes, of varied thermostability. All samples of raw milk contain, in particular, an enzyme *phosphatase* which rapidly hydrolyses at body temperatures phosphoric esters of the type of glycerophosphates, hexosephosphates, etc. This enzyme is not only readily recognizable, but is destroyed completely during the holder process if the latter is carried out correctly. It is a most fortunate accident that the rate of thermal destruction of phosphatase in milk is such that it is only just completely destroyed by the minimal temperature and time of exposure required for legal pasteurization in Great Britain (145° F. for 30 minutes). The methods of determination of the presence of this enzyme are now so delicate that quite small errors of underexposure (errors which are, nevertheless, potentially dangerous), such for example as exposure to 143.5° F. instead of 145° or exposure at 145° for 20 minutes only, or the addition of as little as 0.25 per cent of raw milk to the pasteurized bulk, may be detected. It is of first importance that over all ranges of time and temperature of heating of milk, *i.e.*, in the "flash" as well as the "holder" range, phosphatase is some-

\*Moreover as pointed out by Milligan (4), much of the milk sold as pasteurized in a local authority's area may be pasteurized outside that area, rendering inspection of the plant used difficult or impossible in many cases.

†The early stages of the development of this method were carried out in the Biochemical Department of the University of Toronto in 1932.



what less readily destroyed than is *Mycobacterium tuberculosis* so that a heated milk which does not contain the enzyme has presumably been sufficiently heated to destroy any tubercle organisms originally present. Since these are the most heat-resistant of the pathogenic organisms likely to occur in milk all the original pathogenic flora must have been destroyed also (9).

It is naturally not possible to exclude by the phosphatase test the remote chance of reinfection of the milk *after* pasteurization, e.g., from a human carrier, nor is it absolutely certain that in a milk which gives a negative phosphatase test every pathogenic organism has been destroyed. It is conceivable that there might be a small leak of raw, infected milk into the pasteurized bulk, in insufficient quantities to give a positive phosphatase test but in sufficient amounts to convey infection. Such a leakage, if it is to escape detection by the phosphatase test, must necessarily be a very small one.

On the other hand, the presence of phosphatase in the processed milk means, unequivocally, inefficiently pasteurized milk. It may indeed mean that the inefficiency is so profound that the milk is virtually or even actually raw. The extent of the error can be graded into the convenient categories "slight", "serious", or "gross" by ascertaining quantitatively the amount of enzyme remaining in the pasteurized product (conveniently estimated as Lovibond blue units). (See 2, 3.)

Details of the method of carrying out the phosphatase test may be found elsewhere (2). The results of its application to a representative series of samples of commercial milk have been reported (3), with the finding that a disturbingly large proportion of pasteurizing plants both in London and elsewhere in England are either inherently functionally inefficient or unsatisfactorily operated. Its successful use by a local health authority in the examination of pasteurized milk sold in his area has been described (4). The physical chemistry of the enzyme has received attention (5) and some aspects of its biological significance have been studied (6) (7), particularly its significance with regard to the stage of lactation and the efficiency of milk secretion in the cow (8). Its relationship to other phosphatases has been described (10). The enzyme is identical with the phosphomonoesterase type AI occurring in the cells of the active mammary gland. Richly equipped with phosphatase, these cells undergo partial breakdown during glandular activity, with the discharge of a portion of their contents into the milk.

#### APPLICATION TO CANADIAN CONDITIONS OF PASTEURIZATION

The phosphatase test, though fairly simple, cannot be properly carried out without a certain amount of laboratory apparatus, care and technical skill. Given these, the results with milk pasteurized at 145°-150° F. are quite clear-cut. Consequently it has been increasingly used in Great Britain during the past year both by dairy chemists for eliminating faults in the functioning of their holder plants, and by health authorities in the routine testing of the pasteurized milk sold in their administrative areas.† But can it be similarly

†One authority, for example, has decided that "serious failure such as would be represented by 10 or more Lovibond blue units on two successive occasions will be regarded as giving grounds for considering the withdrawal of the licence to produce or sell pasteurized milk". The blue units referred to are dealt with in detail in the published articles (2) and (3).

applied to milk which has been treated according to the somewhat less drastic Canadian conditions of pasteurization?

Some experiments on this point have been carried out and published (2). These and other, unpublished data show that the method may lose a certain amount of its precision if it is applied to milk which has been held at a less temperature than 145° F., since at any temperature below 145° a minute fraction of the enzyme, increasing in quantity rather rapidly as 140° is approached, remains undestroyed by the heat treatment. It would be idle to hope, for example, that errors such as the presence of as little as 0.25 per cent of raw milk in the pasteurized bulk—readily detectable if the official minimum exposure allowed is 145° F. for 30 minutes—would be detectable by this test where official minima are as low as 140° F. Nevertheless, even at as low a temperature as 140° F. the greater part of the enzyme is destroyed in half an hour, and by slightly altering the time relationships in the test along the lines indicated in the paper just quoted (where a graph is given to cover various minima of pasteurization temperatures from 140° to 145° F.) it is sure that it may effectively be used for the control of pasteurization in this lower temperature zone. Although with a minimum temperature of 143° F. (recently adopted in Ontario) the phosphatase test will lose a proportion of the extreme sensitiveness which it undoubtedly has with 145° F. as the minimum, yet in practice, with some experience of the method, this loss of sensitiveness will be quite small and will not detract from the practical value of the test for control of the efficiency of the holder process.

The phosphatase test may be equally well applied to the control of the high-temperature short-time pasteurization process. In two careful series of experiments in one of which the Stassano apparatus and in the other the A.P.V. (York plate) apparatus for this type of heating was used correctly, no sample of milk was found which gave a positive phosphatase test. Here, again, lowering of temperature or time of exposure to a dangerous extent, or the presence of small quantities of raw milk in the processed product would have shown up ineluctably. Finally it may be added that the test, with small modifications in technique, will give accurate information regarding the efficiency of pasteurization of cream, and may also be applied to butter to decide whether or not the latter has been made from raw or heated cream.

#### SUMMARY

A brief description is given of the recently introduced phosphatase test for the control of the efficiency of pasteurization. The practical value of the test under various conditions is touched upon.

#### REFERENCES

- (1) Ministry of Health (England), Circular 1533, 1936, p. 6.
- (2) H. D. Kay and W. R. Graham, Jr.: *J. Dairy Res.*, 1935, 6: 191.
- (3) H. D. Kay and F. K. Neave: *Lancet*, 1935, 1: 1516.
- (4) H. J. Milligan: *The Medical Officer*, 1936, 55: 87.
- (5) S. J. Folley and H. D. Kay: *Biochem. J.*, 1935, 29: 1837.
- (6) W. R. Graham, Jr., and H. D. Kay: *J. Dairy Res.*, 1933, 5: 54.
- (7) H. D. Kay and W. R. Graham, Jr.: *J. Dairy Res.*, 1933, 5: 63.
- (8) S. J. Folley and H. D. Kay: *Enzymologia*, 1936, 1: 48.
- (9) C. E. North and H. Park: *Am. J. Hyg.*, 1927, 7: 147.
- (10) S. J. Folley and H. D. Kay: *Ergebnisse d. Enzymforsch.*, 1936, 5: 159.

# Survey of Pasteurization in Canada with a Record of Epidemics due to Raw Milk

R. H. MURRAY, A.M.I.C.E.

*Late Director of the Division of Sanitation, Department of Public Health of  
Saskatchewan, Regina*

THE Committee on Safe Milk of the Canadian Public Health Association has been privileged, through the generous co-operation of provincial and municipal medical officers of health, to receive essential information concerning the extent of pasteurization and data relating to the number of cows tested for tuberculosis and contagious abortion. Figures relating to the latter are very limited but it was thought that attention should be drawn to this subject. Considerable cattle testing for contagious abortion is being carried on but only a relatively small number of clean herds have been established. Information was also sought concerning the occurrence of epidemics due to typhoid fever, paratyphoid fever, scarlet fever, septic sore throat, and undulant fever.

In table I is presented a list of milk-borne epidemics in Canada, with the number of cases and deaths. The data for the past two years have been added to the list which was published in 1934. It is, of course, recognized that the number of cases given in this report, approximately 8,000, represents but a small part of the number of cases of these diseases which had their origin in infected milk. The epidemics recorded are those which were investigated by provincial or municipal authorities and with which milk was definitely associated. There are, in addition, other epidemics in which milk was undoubtedly an important factor in the transmission of the causative agent. These are not included in the data submitted. Further, the total number of sporadic cases of these diseases probably greatly exceeds the number included in the reported epidemics. The cases, however, of the known epidemics and the toll of deaths, 688 in number, give ample evidence of the inherent dangers of unpasteurized milk. Almost without exception these epidemics have been due to unpasteurized or improperly pasteurized milk. The latter aspect of pasteurization is receiving increasing attention. Only by the use of proper equipment, adequate supervision, and the conduct of the process by competent operators can pasteurization be considered satisfactory.

---

*Editorial Note: This article was forwarded from the late Mr. Murray's office shortly after he had commenced a leave of absence necessitated by the serious illness which later occasioned his death. The preparation of the article under such circumstances reflects the faithfulness with which Mr. Murray carried out everything that he undertook to do. An obituary notice appears on page 577.*

TABLE I  
EPIDEMICS FROM MILK-BORNE DISEASE IN CANADA AS RECORDED BY PROVINCES AND MUNICIPALITIES

Year	Municipality	Province	Disease	Cases	Deaths
1906	Saint John	New Brunswick	Typhoid fever	40	3
1912	Winnipeg	Manitoba	Typhoid "	92	7
1913	Calgary	Alberta	Scarlet "	13	0
1916	Winnipeg	Manitoba	Typhoid "	23	0
1918	Quebec City	Quebec	Typhoid "	23	2
1919	Winnipeg	Manitoba	Scarlet "	73	0
1920	Regina	Saskatchewan	Typhoid "	83	9
1921	Montreal	Quebec	Typhoid "	5	0
1921	Vineland	Ontario	Typhoid "	20	0
1922	Quebec City	Quebec	Typhoid "	14	3
1922	Montreal	Quebec	Typhoid "	33	3
1922	Winnipeg	Manitoba	Scarlet "	29	0
1922	Winnipeg	Manitoba	Scarlet "	10	0
1923	Saint John	New Brunswick	Typhoid "	10	0
1923	Sherbrooke	Quebec	Typhoid "	7	2
1923	Arnprior	Ontario	Typhoid "	6	0
1923	Hanover	Ontario	Typhoid "	46	4
1924	Montreal	Quebec	Typhoid "	16	2
1924	Quebec City	Quebec	Typhoid "	8	0
1924	Quebec City	Quebec	Paratyphoid fever	5	0
1925	Winnipeg	Manitoba	Scarlet fever	28	0
1925	Winnipeg	Manitoba	Typhoid "	9	2
1926	Winnipeg	Manitoba	Typhoid "	15	0
1927	Montreal	Quebec	Typhoid "	5002	533
1927	Chatham	Ontario	Typhoid "	109	7
1927	Quebec City	Quebec	Typhoid "	12	0
1928	Quebec City	Quebec	Typhoid "	20	4
1928	Dundas	Ontario	Typhoid "	13	0
1928	Timmins	Ontario	Typhoid "	10	0
1928	Sturgeon Falls	Ontario	Typhoid "	12	0
1929	Edmonton	Alberta	Scarlet "	28	0
1929	Ameliasburg	Ontario	Typhoid "	17	2
1930	Belleville	Ontario	Typhoid "	18	3
1930	Kirkland Lake	Ontario	Septic sore throat	457	4
1930	S. Westminster	British Columbia	Typhoid fever	14	1
1930	Montreal	Quebec	Typhoid "	130	26
1930	Montreal	Quebec	Typhoid "	96	12
1931	Kitchener	Ontario	Scarlet "	11	0
1931	St. Catharines	Ontario	Paratyphoid fever	487	3
1931	Surrey	British Columbia	Typhoid fever	14	1
1931	Hampton	New Brunswick	Typhoid "	7	0
1931	La Pêrade	Quebec	Typhoid "	29	2
1931	Dauphin	Manitoba	Septic sore throat	100	0
1932	St. Maurice Valley	Quebec	Typhoid fever	527	45
1933	St. Catharines	Ontario	Paratyphoid fever	30	0
1933	Carman	Manitoba	Typhoid fever	15	1
1933	Port Elgin	Ontario	Septic sore throat	27	0
1933	Kingston	Ontario	Typhoid fever	19	0
1933	St. Eustache	Quebec	Typhoid "	27	2
1934	Moose Jaw	Saskatchewan	Undulant "	21	0
1934	Edmunston	New Brunswick	Typhoid "	12	0
1934-35	Shawinigan Falls	Quebec	Typhoid "	59	5
1935	Minnedosa	Manitoba	Undulant "	4	0
Total				7935	688

## EPIDEMICS ACCORDING TO DIAGNOSIS

	Epidemics	Cases	Deaths
Typhoid fever	38	6612	681
Paratyphoid fever	3	522	3
Scarlet fever	7	192	0
Septic sore throat	3	584	4
Undulant fever	2	25	0
	53	7935	688

*Survey of Pasteurization in Cities in Canada with over 20,000 Population*

In supplying information concerning the extent of pasteurization in the larger cities of Canada, the medical officers of health have estimated the quantity of milk pasteurized in their communities. The number of pasteurizing plants has also been given. These data are presented in table II.

TABLE II

PASTEURIZATION AND TESTING OF CATTLE IN CITIES IN CANADA WITH OVER 20,000 POPULATION

City	Province	Population, 1931 census	Percentage of milk pasteurized	No. of pasteurizing plants	Percentage of dairy cows tuberculin tested	Percentage of dairy cows tested for contagious abortion
Montreal.....	Que.	818,577	95.	28	100	10
Toronto.....	Ont.	631,207	100	55	75	25
Vancouver.....	B.C.	246,593	78	18	100	nil
Winnipeg.....	Man.	218,785	78	10	25	nil
Hamilton.....	Ont.	155,547	100	21	90	7
Quebec.....	Que.	130,594	50	6	100	nil
Ottawa.....	Ont.	126,872	99	14	100	23
Calgary.....	Alta.	83,761	78	4	100	nil
Edmonton.....	Alta.	79,197	79	6	100	nil
London.....	Ont.	71,148	86	17	14	14
Windsor.....	Ont.	63,103	100	11	...	...
Verdun.....	Que.	60,745	98	..	100	100
Halifax.....	N.S.	59,275	80	8	80	10
Regina.....	Sask.	53,209	98	7	100	nil
Saint John.....	N.B.	47,514	90	7	100	nil
Saskatoon.....	Sask.	43,291	100	4	100	nil
Victoria.....	B.C.	39,082	33	4	100	nil
Three Rivers.....	Que.	35,450	53	..	..	..
Kitchener.....	Ont.	30,793	97	10	50	nil
Brantford.....	Ont.	30,107	97	7	51	..
Sherbrooke.....	Que.	28,933	25	1	100	nil
Ft. William.....	Ont.	26,277	85	7	30	15
St. Catharines.....	Ont.	24,753	100	8	98	30
Westmount.....	Que.	24,235	98	2	100	80
Kingston.....	Ont.	23,439	..	..	..	..
Oshawa.....	Ont.	23,439	100	5	74	18
Sydney.....	N.S.	23,089	17	3	7	nil
Sault Ste. Marie.....	Ont.	23,082	75	4	100	25
Peterborough.....	Ont.	22,327	70	5	50	50
Moose Jaw.....	Sask.	21,299	89	3	100	5
Guelph.....	Ont.	21,075	68	4	100	12
Glace Bay.....	N.S.	20,706	16	1	5	nil
Moncton.....	N.B.	20,689	20	2	100	nil

Information concerning the extent to which pasteurization is being used is of such importance that the essential facts should be obtained in detail. It is obvious that if more adequate information is to be obtained, the Committee should prepare a form on which the details may be conveniently supplied. Unfortunately it has not been possible this year to

prepare such a form. Further, this information should not be limited to the larger cities but should include reports from the smaller cities and the towns. Such a survey would reveal the very limited extent to which pasteurization is being used in the smaller urban communities.

Included in table II are the data concerning the percentage of dairy cows which have been tuberculin tested and the percentage tested for contagious abortion. In keeping with the widespread interest in tuberculosis control on the part of dairy farmers and cattle breeders and the establishment of restricted areas, there is a marked increase in the number of cities which obtain the greater part of their milk supply from tuberculin tested herds. In twenty cities 80 per cent or more of the milk is obtained from such herds.

Through the co-operation of the provincial departments of health information was obtained concerning the approximate number of dairy cows in each of the provinces and an estimate of the percentage of dairy cows which have been tested for tuberculosis and contagious abortion. These data are presented in table III.

TABLE III

Name of Province	Approximate no. of dairy cows	Estimated percentage of dairy cows tested for		No. of municipalities with compulsory pasteurization
		Tuberculosis	Infectious bovine abortion	
Prince Edward Island	47,000	100%	not available	none
Nova Scotia	117,000	....	1.7%	none
New Brunswick	236,000	70%	1%	none
Quebec	970,000	55%	1%	seven
Ontario	1,176,000	not available	not available	thirty-five
Manitoba	330,000	20%	1%	none
Saskatchewan	553,000	27%	3%	three
Alberta	470,000	9%	2%	none
British Columbia	110,000	55%	1%	none

The honour roll of municipalities which have passed by-laws requiring all milk to be pasteurized includes the names of 44 towns and cities. They are as follows: Aurora, Ont.; Barrie, Ont.; Carleton Place, Ont.; Cochrane, Ont.; Conistan, Ont.; Drummondville, Que.; Dundas, Ont.; Dunnville, Ont.; Forest, Ont.; Fort Erie, Ont.; Forest Hill, Ont.; Galt, Ont.; Hamilton, Ont.; Iroquois Falls, Ont.; Kapuskasing, Ont.; Kerrobert, Sask.; Kingston, Ont.; Kirkland Lake, Ont.; Lachine, Que.; Leamington, Ont.; Leaside, Ont.; Meaford, Ont.; Montreal, Que.; Moosomin, Sask.; Newmarket, Ont.; Niagara Falls, Ont.; North Bay, Ont.; Orillia, Ont.; Oshawa, Ont.; Outremont, Que.; Port Colborne, Ont.; Richmond Hill, Ont.; St. Catharines, Ont.; St. Eustache, Que.; Saskatoon, Sask.; Simcoe, Ont.; Sudbury, Ont.; Timmins, Ont.; Toronto, Ont.; Verdun, Que.; Welland, Ont.; Westmount, Que.; Whitby, Ont.; and Windsor, Ont.

The correspondence with health departments in the gathering of the information presented in this survey contained frequent references to the difficulties which confront municipalities in obtaining the pasteurization of all milk offered for sale. It is evident from this report that very little progress



is being made in achieving this objective in several cities. On the other hand, a number of cities record considerably larger quantities as being pasteurized. New and more effective regulations have been introduced in several provinces which will not only assure more efficient pasteurization but should definitely strengthen the health officer in his efforts to obtain pasteurization. It is evident that there must be no slackening of the efforts to create a strong public opinion based on an intelligent understanding of the value of milk and the necessity of pasteurization.

### Tuberculosis Mortality in Canada, 1935\*

THE death rate for tuberculosis in Canada for the first time since 1930 shows an increase, there being 6,591 deaths reported as against 6,431 for 1934; the rate per 100,000 increasing from 59.5 to 60.3. This increase was not general throughout Canada as Prince Edward Island, Ontario, Saskatchewan and British Columbia all reported a decrease and their reports were lower than any previous year. The provinces showing an increase were Nova Scotia, New Brunswick, Quebec, Manitoba and Alberta. This increase, although slight, serves as a warning that every effort must be put forth, particularly in those provinces showing a high death rate, to offset this temporary increase. It is of interest to note that the two provinces, Saskatchewan and Ontario, which have the highest proportion of treatment beds, have continued to show the lowest death rate from tuberculosis in Canada and have also shown a further reduction in death rate.—*Bulletin of the Canadian Tuberculosis Association, September, 1936.*

#### TUBERCULOSIS MORTALITY, CANADA, 1922-1935

RATE PER 100,000

Year	Total	P.E.I.	N.S.	N.B.	Quebec	Ontario	Manitoba	Sask.	Alberta	B.C.
1922	86.1	125.9	133.2	107.5	116.0	66.4	61.0	44.5	52.7	93.7
1925	81.0	101.2	113.9	103.6	111.0	60.2	60.9	43.2	58.8	92.2
1928	81.0	113.7	112.3	101.8	119.8	56.4	61.0	44.7	51.8	100.2
1931	73.5	77.3	102.2	83.0	110.6	50.3	61.2	35.4	52.2	92.4
1934	59.5	104.5	88.9	67.0	88.8	37.5	53.2	30.4	41.4	78.5
1935	60.3	67.5	92.4	77.4	91.9	36.2	58.5	27.8	42.2	76.9

\*Data from preliminary annual report issued by the Vital Statistics Branch, Dominion Bureau of Statistics, Ottawa.

## B. Alkalescens (Andrewes): Its Relation to Members of the Typhoid-Dysentery Group\*

M. H. BROWN, M.D., B.Sc. (MED.), AND E. A. ANDERSON, B.H.Sc., M.A.  
Connaught Laboratories, University of Toronto

IN 1918, Andrewes (1) defined *B. alkalescens* as "an organism simulating Flexner bacillus but fermenting dulcitate and producing alkali with much vigour". He did not consider it definitely related to *B. dysenteriae* Flexner nor did he believe it to be pathogenic. However, Welch and Mickle (2) in 1934 claimed to have established a definite relationship, both serologically and by use of the Shwartzman reaction, between strains of *B. alkalescens* and other members of the dysentery group. No serological agreement with strains of *B. typhosus* could be found. Later in the same year Gilbert (3) suggested that *B. alkalescens* was a variant of *B. typhosus*. Her reasons were that *B. typhosus* cultivated in a medium containing typhoid antiserum may assume biochemical and antigenic properties of *B. alkalescens*, and that in the examinations of faecal specimens *B. alkalescens* was found more often where *B. typhosus* was the etiological agent than where other micro-organisms were incitants of the disease. With this conception of *B. alkalescens* in mind, it has become the practice in some diagnostic laboratories to submit a report of the presence of "atypical typhoid" and "typhoid variant" where *B. alkalescens* is isolated from the specimen submitted. Observations on ten strains of *B. alkalescens* isolated by us during the examination of faeces from 157 persons lead us to believe that this practice is unjustified.

These strains were isolated from faeces received (a) during investigations of three outbreaks of enteric diseases, (b) from a case of chronic enteritis, and (c) from 129 healthy persons. Eight of the ten strains were from cases of enteric disease, two from normal persons. All cultures obtained conformed to the characteristics of *B. alkalescens*: non-motile gram negative bacilli which grow well on plain agar and on MacConkey's bile salt lactose medium without production of acid, production of acid but not gas in media containing dextrose, maltose, mannite, xylose, arabinose, rhamnose and dulcitate; lactose, inositol and raffinose are not utilized; indol is formed; H<sub>2</sub>S is not produced in lead acetate medium. These alkalescens cultures were tested for agglutination with sera of *B. dysenteriae* Sonne, *B. dysenteriae* Flexner and *B. typhosus* ("H" and "O"). All tests were negative. A polyvalent dysentery horse serum showed moderate agglutination of all the strains. The polyvalent horse serum was prepared by injecting a horse with ten strains of *B. dysenteriae* Flexner. These results are in accord with the findings of Welch and Mickle (2) that

\*Presented before the Royal Society of Canada, Section V, Ottawa, May, 1936.

there is some antigenic bond between *B. alkalescens* and the dysentery bacilli. Specific rabbit agglutinating sera separately produced by injecting killed cultures of two of these strains each agglutinated all the other strains.

In only one instance was *B. alkalescens* isolated from an individual suffering from *B. typhosus* infection. This was obtained during an outbreak of typhoid fever in a mental hospital. Only one specimen was received from each case. *B. typhosus* was isolated from all samples except the one in which *B. alkalescens* was found. However, the serum of this patient agglutinated typhosus "O" and "H" antigens to such a high titre that there was no doubt that the patient suffered from *B. typhosus* infection.

Two strains of *B. alkalescens* were obtained from stools examined during an epidemic of *B. dysenteriae Flexner* involving a small town (4). A strain of *B. dysenteriae Flexner* was found to be the infecting agent. Here again, only one sample of faeces was obtained from each patient and again where *B. alkalescens* was found the micro-organism causing the epidemic was not isolated. A sample of blood was obtained from only one of the patients harbouring *B. alkalescens* and the serum, when tested against *B. alkalescens*, showed only a faint trace of agglutination whereas with *B. dysenteriae Flexner*, complete agglutination showed to a high titre. It is obvious that this patient had a *B. dysenteriae Flexner* infection.

The third outbreak (5) from which *B. alkalescens* was isolated was in a hospital, wherein paratyphosus A was established as the etiological agent of the epidemic. From stool examinations of ten people ill at this time, four strains of *B. alkalescens* were obtained. No evidence of any *B. typhosus* infection was found.

Repeated faeces examinations from a case of chronic enteritis which has persisted for three years have frequently yielded large numbers of *B. alkalescens* cultures. Search for evidence of amoebic dysentery, tubercle bacilli, or any pathogenic micro-organism of the typhoid-dysentery group has been unsuccessful. The patient's serum shows only a negligible trace of agglutination for *B. typhosus* and no agglutination for *B. alkalescens*.

From examinations of faeces samples from 129 healthy persons, two strains of *B. alkalescens* have been obtained. These two strains were the only non-lactose fermenting cultures isolated from the group. Neither of the persons from whom *B. alkalescens* was obtained gave any history of having had typhoid fever.

#### SUMMARY

From our experience and the reports of others (2) (3) it appears that *B. alkalescens* is found more often associated with disease than in healthy conditions. Of specimens from 28 cases of enteric disease, 8 or 28.6 per cent contained *B. alkalescens*. Of samples from 129 healthy persons, only 2 or 1.4 per cent showed the presence of this micro-organism. That it may produce lesions in man is suggested by our examinations in the case of chronic enteritis. Although this patient developed no agglutinins in his blood for *B. alkalescens*, the continued isolation of large numbers of this micro-organism over a period

of time and the absence of any signs of other infecting agents lead one to believe that the condition may have been caused by *B. alkalescens*. Welch and Mickle (2) report an outbreak of a dysentery-like disease the etiological agent of which was *B. alkalescens*, and Smith and Fraser, in 1928 (6), found *B. alkalescens* in a case of continued fever and diarrhoea. No evidence of *E. typhi* infection was found in any of these cases.

We have been unable to show any serological relationship between *B. typhosus* and *B. alkalescens* but have found that polyvalent dysentery sera agglutinate strains of *B. alkalescens* which we isolated.

There seems no direct relation between *B. alkalescens* and the infecting micro-organism with which it is found since we have isolated it in outbreaks of typhoid fever, paratyphoid fever and dysentery.

#### ACKNOWLEDGMENT

We wish to express our appreciation to Professor D. T. Fraser for his valuable assistance in the preparation of this paper.

#### REFERENCES

- (1) Andrewes, F. W.: Dysentery bacilli; the differentiation of the true dysentery bacilli from allied species, *Lancet*, 194:560, 1918.
- (2) Welch, H., and Mickle, F. L.: Relationship of *Shigella alkalescens* to other members of the *Shigella* group, *Am. J. Pub. Health*, 24:219, 1934.
- (3) Gilbert, R., and Coleman, M. B.: Evidence that *B. alkalescens* (Andrewes) may be a variant of *B. typhosus*, *Am. J. Pub. Health*, 24:449, 1934.
- (4) Foley, A. R.: An Epidemic of Bacillary Dysentery, *Canad. Pub. Health J.*, 24:113, 1936.
- (5) Foley, A. R., Faille, J. L., and Brandon, K. F.: A Hospital Epidemic of Paratyphoid A, *Canad. Pub. Health J.*, 27:313, July, 1936.
- (6) Smith, J., and Fraser, A. M.: A case of continued fever due to *B. alkalescens* (*Eberthella alkalescens*) Andrewes, *J. Path. & Bact.*, 31:511, 1928.

### Fifth Annual Christmas Meeting

#### LABORATORY SECTION

Royal York Hotel, Toronto

MONDAY, DECEMBER 21st

Afternoon and Evening

TUESDAY, DECEMBER 22nd

Morning and Afternoon

# Ensuring the Safety of BCG Vaccine by Animal Inoculation\*

ARMAND FRAPPIER B.A., M.D., L.-ès-Sc.

AND

VICTORIEN FREDETTE, B.Ph., M.Sc.

*Department of Bacteriology, Faculty of Medicine  
University of Montreal, Montreal, Quebec*

IT is essential that the preparation of BCG for human beings be conducted in special, well-equipped laboratories where the rigorous technique of Calmette is closely followed and the preparation is safeguarded in every way from contact with tuberculosis. Calmette recommended that, for a reasonably limited zone, only one laboratory be charged with the preparation of BCG. It is only when the technique is strictly followed that BCG vaccine can be prepared and administered without fear to human beings (1, 2, 5). The inoculation of animals with each lot that is prepared to establish its innocuity is, of course, an essential safeguard. At the University of Montreal the preparation of the weekly emulsions of BCG for use in children is conducted in the Department of Bacteriology, of which one of the authors is the director. Details of the technique have been presented in a previous paper (4).

To control constantly the purity and the innocuity of our strain of BCG, we inject each emulsion into three guinea pigs. Doses are ordinarily of 0.010 gm., 0.005 gm., and 0.0025 gm. of BCG and the modes of inoculation vary. Before using the guinea pigs, each one is tested twice, at one week's interval, with an intradermal dose of 0.01 cc. of pure tuberculin from l'Institut Pasteur diluted in 0.1 cc. We select animals which are absolutely negative to tuberculin and the weight of which is not more than 450 gm.

At least 10 guinea pigs, not inoculated, are kept under the same conditions as controls.

All these animals are from the same stock and are kept under excellent conditions and fed with material which we require to have been safeguarded from any tuberculous contact. The BCG animal house is completely isolated and kept free from all tuberculous contamination. When an animal dies, an autopsy is performed within twenty-four hours and a careful examination is made of all the organs and lymph glands. Stained preparations of caseum, pus, or other suspicious material, when found, are exhaustively examined under the microscope. Inoculation is made of the suspicious material, using two guinea pigs.

From the beginning to the end of the preparation and testing of the

---

\*Presented at the Fourth Annual Christmas Meeting of the Laboratory Section, Canadian Public Health Association, Toronto, December 30, 1935.

vaccine, each step is numbered and recorded. This system permits us to trace the whole history of any emulsion and of the guinea pigs used.

From January 1933 to March 1935, 355 guinea pigs were inoculated either subcutaneously, intraperitoneally or intradermally. Of these, 26 received autopsy material from guinea pigs inoculated with BCG which had died of intercurrent disease or had been killed. Findings in regard to this group of 26 animals will be discussed later in this paper. In table I the doses of BCG administered and the routes of inoculation are presented as relating to 329 animals. Of these 157 were dead and 172 were still living in March, 1935, some of them 1,000 days after inoculation.

TABLE I  
INOCULATION OF 329 GUINEA PIGS WITH BCG  
DOSES AND ROUTES OF INOCULATION  
January, 1933—March, 1935

No. of Animals	Route	Dose	No. Inoculated
205	Intraperitoneally	0.10 gm.	77
		0.005 "	54
		0.0025 "	51
		0.0001 "	17
		0.00001 "	6
76	Subcutaneously	0.010 gm.	26
		0.005 "	25
		0.0025 "	25
46	Intradermally	0.010 gm.	17
		0.001 "	17
		0.0001 "	6
		0.00001 "	6
2	Oral	0.030 gm.	2

10—normal—controls.

## RESULTS

### *Weights*

Weights are observed weekly for the first two months for nearly all healthy guinea pigs and once a month thereafter. Weight increase is observed to proceed substantially, if not regularly, each month.

A very small number of guinea pigs lose a few grams during the first two weeks after inoculation but they rapidly regain and even surpass their initial weight before the end of the month. A progressive loss of weight is suggestive of intercurrent disease, which is confirmed by autopsy.

The average increase in weight is practically the same in the inoculated as in the non-inoculated, with no variation according to dose or route of inoculation.

### *Autopsy Findings*

Of the 157 guinea pigs which died, 25 died from accidents or were killed



and the remaining 132 died of intercurrent diseases, as shown by autopsies. In nearly every case the cause of death was obvious. In all cases no evidence of tuberculosis was found.

Most of the deaths were due to streptococcic and pneumococcic infections, which have been endemic at times in our colony. In some cases the lymph-glands contained enormous numbers of haemolytic streptococci. In others the spleen has been greatly enlarged, containing white granules which resembled in shape tuberculous lesions. These granules, however, contained large numbers of streptococci but no acid-fast bacilli. Reinoculation into normal animals did not on any occasion give evidence of tuberculosis.

In not one of these 157 deaths has generalized tuberculosis been found, nor have we ever encountered progressive and reinoculable tuberculous lesions.

#### *Lesions Attributable to BCG*

At the end of the first week following the subcutaneous inoculation of 0.010 gm. of BCG, but rarely with smaller doses, we have observed in most instances stiffness of the leg and a palpable nodule at the site of inoculation. The nodule proceeds to abscess formation which usually discharges a caseous pus containing acid-fast bacilli. It heals rapidly and the health of the animal, as judged by weight and activity, does not seem to be affected.

Following intradermal inoculation of a similar dose, abscess formation was observed in every case. After discharging, the abscess heals in two to three weeks. Small discharging abscesses were also noted following doses as small as 0.00001 gm. of BCG.

When intraperitoneal inoculations are made of 0.010 gm. of BCG, a subcutaneous abscess is rarely noted at the site of inoculation. When such an abscess does occur, it is usually very small and never breaks down.

At autopsy the largest lesions attributable to BCG were found in guinea pigs inoculated intraperitoneally. These lesions are caseous omental abscesses, well encapsulated and apparently in a state of regression. Such lesions have been observed by all workers. With the inoculation of from 0.005 and 0.010 gm. of BCG the abscesses or nodules, when present, range from the size of a pea to that of a bean and usually are two or three in number. With the inoculation of smaller amounts, namely 0.0025 gm. and less, abscess formation is usually not observed.

It is not possible in this communication to review the evolution of the lesions caused by the inoculation of BCG. We note, however, that in many cases which have received an intraperitoneal dose of from 0.0025 to 0.010 gm. numerous small, yellow-coloured granulations containing acid-fast bacilli were already present in the omentum about fourteen days after inoculation. Well-formed characteristic abscesses were observed as early as fifty-five days after inoculation. Examination of inoculated animals after four hundred days did not usually show the presence of lesions. In rare cases lesions could be demonstrated as late as 516 days after inoculation. There is a great individual variation among guinea pigs in the production of these lesions and about sixty-six per cent of those inoculated intraperitoneally and examined at the periods mentioned showed no macroscopic lesions imputable to BCG.

TABLE II

GUINEA PIGS INOCULATED WITH ORGANS OR CASEUM EMULSIONS FROM GUINEA PIGS  
VACCINATED WITH BCG

(from January, 1933 to March, 1935)

Guinea-Pig no	BCG G.P. nos.	Material inoc.	Days after inoc.	Weight at inoc.	Weight actual or at death	Observations	Causes of death
32	5	Caseum intra-perit.	84			No macroscopic trace of BCG or of tuberculosis	Ordinary pneumonia
33	5	Caseum sub-cut.	53			No macroscopic trace of BCG or of tuberculosis	Accident
34	4	Caseum intra-perit.	344	425	685	No evidence of BCG and tuberculosis	Pneumonia and general streptococcic infection
35	4	Caseum sub-cut.	7			Iliac gland slightly enlarged	Streptoc. pleurisy
25	21	Mesenteric granulation intrap.	568	450	875	No evidence of BCG and tuberculosis	Killed
26	21	Id. sub-cut.	568	460	857	No evidence of BCG and tuberculosis	Killed
30	21	Liver gran. intrap.	568	425	970	No evidence of BCG and tuberculosis	Killed
31	21	Id. sub-cut.	528	410	595	No evidence of BCG and tuberculosis	Peritonitis
20r	B-13	Caseum sub-cut.	300	440	740	No evidence of BCG and tuberculosis	Pneumonia and pneumococcic pleurisy
21r	B-13	Id.	395	370	795	No evidence of BCG and tuberculosis	Lobar pneumonia

TABLE II—*Continued*

Guinea-Pig Nos.	BCG G.P. Nos.	Material inoc.	Days after inoc.	Weight at inoc.	Weight actual or at death	Observations	Causes of death
81	11-2	Spleen	97	575	784	No trace of BCG and tuberculosis	Post-abortion haemorrhages
82	11-2	Spleen	107	550	1005	No trace of BCG and tuberculosis	Purulent pleurisy
25-r	B-6	Caseous nodule	16	430	520	No trace of BCG and tuberculosis	Abscess at the site of inoc.; purulent peritonitis
24r	B-6	Caseous nodule	16	470	398	No trace of BCG and tuberculosis	Same lesions as above; abscess inoc. to g.p. 36-r and 45-r
36-r	24-r	Abscess	210			No trace of BCG and tuberculosis	Killed
45-r	24-r	Abscess	22	350	350	No trace of BCG and tuberculosis	Purulent pleurisy
26-r	62	Liver abscess	150	450	465	No trace of BCG and tuberculosis	Killed
27-r	62	Liver abscess	30	375	400	No trace of BCG and tuberculosis	Purulent peritonitis
54-r	5-r	Liver abscess	8			No trace of BCG and tuberculosis	Broncho - pneumonia; sub. max. strept. glands
55-r	5-r	Liver abscess	210			No trace of BCG and tuberculosis	Lobar pneumonia
148	68-r	Mesent. abscess	200			No trace of BCG and tuberculosis	Killed
149	68-r	Id.	14			No trace of BCG and tuberculosis	Purulent peritonitis
60-3	9-3	Omental nodule	79			In good health	
61-3	9-3	Id.	79			In good health	
125	77-r	Spleen	60			In good health	
126	77-r	Spleen	60			In good health	

In two animals we have observed abscesses in the liver 57 days and 364 days after inoculation. The spleen was not enlarged and inoculation of the material from the abscesses into guinea pigs did not result in the development of lesions. Typical results of such reinoculation are presented in table II as relating to guinea pigs 30, 31, 26r, 54r, 55r, and 27r.

Old abscesses present a characteristic picture when examined histologically. The abscess is well encapsulated, having a thick wall of connective tissue rich in collagen but poor in fibroblasts. The capsule envelopes an agglomeration of polymorphs, but toward the periphery a network of connective tissue cells is present, indicating that the lesion was regressive.

Inoculation of material from such old abscesses has never produced tuberculosis, although acid-fast bacilli may be present. Of interest also is the observation that frequently the omentum is connected with the liver, spleen, and abdominal wall by fibrous tissue.

Calmette, as is well known, compared these omentum abscesses with the similar type of lesions produced by the inoculation of dead tubercle bacilli. He defined virulence in tuberculosis as the property of the strain to produce progressive and reinoculable tuberculosis. As previously stated, in our reinoculations tuberculous lesions have never been found.

The complete histories of the series of guinea pigs, 26 in number, inoculated with autopsy material from guinea pigs, are presented in table II. The longevity, the weight increase, and the autopsy findings in these guinea pigs support the assertion that the reinoculation did not give rise to tuberculous lesions.

#### CONCLUSION

Observations made over several years in the routine animal testing of the strain of tubercle bacilli known as BCG have corroborated the findings of Calmette and many other observers that this strain does not increase in virulence when carried under the conditions laid down by Calmette. With the inoculation of large doses intraperitoneally definite lesions are found which are regressive and reinoculation of material from such lesions has not been followed by the development of tuberculosis.

#### ACKNOWLEDGMENT

We desire to express our sincere thanks to the National Research Council of Canada, to the Faculty of Medicine of the University of Montreal, and especially the Dean, Dr. T. Parizeau, for the hearty encouragement given to us in our work.

#### REFERENCES

- (1) Calmette, A.: *La vaccination préventive contre la tuberculose par le BCG*. Masson, Paris, 1927.
- (2) Calmette, A.: *Technique des cultures de BCG*. Imprimerie Maretheux et Pactat, Paris.
- (3) Institut Pasteur: *Vaccination préventive de la tuberculose par le BCG: Rapports et documents*. Masson, Paris, 1932.
- (4) Frappier, A.: *Rapports confidentiels au Conseil national des recherches du Canada, Comité de la tuberculose, 1934 and 1935*.
- (5) League of Nations: *Report of the Technical Conference for the Study of BCG, 1928*.

# EDITORIAL SECTION

## EDITORIAL BOARD

R. D. DEFRIES, M.D., D.P.H., *Chairman*  
J. T. PHAIR, M.B., D.P.H., AND N. E. MCKINNON, M.B., *Associate Chairmen*  
R. L. RANDALL, *Editorial Assistant*

G. D. PORTER, M.B., <i>Public Health Administration.</i>	D. T. FRASER, B.A., M.B., D.P.H., <i>Mental Hygiene.</i>
A. L. MCKAY, B.A., M.B., D.P.H., <i>Epidemiology and Vital Statistics.</i>	A. E. BERRY, M.A.Sc., C.E., Ph.D., <i>Public Health Engineering.</i>
A. L. MACNABB, B.V.Sc., <i>Laboratory.</i>	LAURA A. GAMELE, REG.N., <i>Public Health Nursing.</i>
GORDON BATES, M.B., <i>Social Hygiene.</i>	J. G. CUNNINGHAM, B.A., M.B., D.P.H., <i>Industrial Hygiene.</i>
E. W. MCHENRY, M.A., Ph.D., <i>Food, Drugs and Nutrition.</i>	JAMES CRAIGIE, M.B., Ch.B., Ph.D., D.P.H., <i>St. And., Current Health Literature.</i>
MARY POWER, B.A., <i>Public Health Education.</i>	
A. H. SELLERS, B.A., M.D., D.P.H., <i>Books and Reports.</i>	

## THE SIXTY-FIFTH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

THE choosing of the city for the holding of the annual meeting of any national organization is always beset with difficulties. The American Public Health Association is endeavouring to meet the situation by dividing the continent into nine areas, each of which will be visited in the course of twelve years. Such a plan makes it possible for the Association to keep its members in touch with the problems that pertain to particular geographic areas of the continent as well as to maintain a feeling of solidarity among its membership. The holding of the sixty-fifth annual meeting in New Orleans fully justified the choice of the Governing Council, even though the attendance was necessarily reduced by the distance from the homes of so many members. An attendance of approximately 1,500 is ample evidence of the interest and appeal that New Orleans has for those who know its history.

From the public health standpoint New Orleans has great interest. The first convincing demonstration on a large scale of the eradication of yellow fever by mosquito control was made in this city. Important contributions have been made to our knowledge not only of the disease and conditions that commonly occur in temperate zones but also of those that are distinctly tropical, including hook worm, malaria, beriberi, leprosy, dysentery, yellow fever, and pellagra. The fascinating story of the city's fight for health was presented by Dr. A. E. Fossier, Medical Officer of Health, in which a striking relationship was demonstrated between the inauguration of sanitary improvement and the reduction in general death rate, the decrease in infant mortality, and the increase in life expectancy. To-day New Orleans, once disease ridden because of yellow fever, typhus, typhoid, smallpox, tuberculosis, malaria and dysentery, has health conditions which compare favourably with those of other American cities.

The outstanding address of the convention was that of Surgeon General Thomas Parran, President-elect of the Association. Dr. Parran stressed that the public health movement to-day has the specific responsibility of furnishing through community effort life-saving services which the individual is not sufficiently able to provide by his own efforts. Whether or not such services are administered by the health department is a matter for the state or locality

to decide, but it is a responsibility of the health department to see that such provision is made. He urged that a telescopic view of health problems be substituted for the microscopic view and that the method of mass attack upon certain diseases be undertaken by mobilizing the resources of the medical profession, social agencies, and health departments. Such a mass attack is being conducted against pneumonia in New York State with the co-operation of the organized medical profession and against cancer in Massachusetts. In many health departments he felt that too great emphasis was being laid on providing balanced programs instead of concentrating efforts in a frontal attack on certain preventable conditions. Each program must meet local needs and too great emphasis on standardization is a danger. In reviewing the significant developments of the past year in national public health work in the United States, Dr. Parran stressed particularly the need for establishing on a strong foundation the new undertakings made possible by the expenditure of thirteen million dollars provided by the Social Security Act for current use. An excellent start has been made but how far this program for extending public health services will go depends on how effectively health departments secure public support.

Of particular interest this year was the awarding of the Sedgwick Memorial Medal for distinguished service in public health to Dr. Frederick F. Russell, who retired recently as General Director of the International Health Division of the Rockefeller Foundation and is now Lecturer in Preventive Medicine and Public Health in Harvard Medical School and Harvard School of Public Health. Dr. Russell is internationally known for the distinguished service which he rendered in the field of the public health by demonstrating the value of typhoid vaccine in the prevention of typhoid fever in 1911 among the troops serving on the Mexican border. In the United States Army Medical Corps and in the International Health Division he has also rendered outstanding service.

The program of the meeting was most comprehensive. In each of the nine Sections technical papers of special interest to the Section membership were presented. To bring to the membership as a whole contributions from each of the Sections, the plan of devoting one session to "recent advances in public health", contributed by the respective Section chairmen, was again followed and was greatly appreciated. Another session was devoted to syphilis, presenting the administrative, epidemiological and laboratory aspects. Particular emphasis was laid on the importance of the effective participation of the medical profession in a plan for the control of this disease. Attention was directed to the urgent need for improvement of housing conditions in the United States. Dr. C.-E. A. Winslow of Yale University made reference to an estimate that five million low-cost dwellings are needed and that the problem cannot be solved by commercial enterprise alone as most of those affected have incomes too low to permit them to pay for housing even of a minimum standard. In the general sessions and in Section programs the subject of respiratory infections was discussed. The present state of our knowledge of influenza and common colds was reviewed in the Epidemiology Section. The state-wide program for pneumonia control in New York State was discussed in detail. Active programs are being undertaken also in New York City, Michigan, Maine, Connecticut and Massachusetts.



The truly international character of the Association was well reflected in the representation from Canada, Mexico and Cuba and the nomination of Dr. Angel de la Garza Brito of Mexico and Dr. R. E. Wodehouse of Canada as Vice-presidents.

#### ONLY PROPERLY PASTEURIZED MILK IS SAFE MILK

**T**HIS brief sentence epitomises the position of the Canadian Public Health Association in regard to the safeguarding of milk supplies. It is with this conviction that medical officers of health and physicians throughout Canada are urging municipalities to adopt adequate milk control by-laws, which include, of course, measures for the production of clean milk. Pasteurization, however, is the final safeguard. Raw milk is the most important source of spread of tuberculosis and undulant fever from cattle to man as well as of transmission of septic sore throat, typhoid fever, and scarlet fever from man to man. During the past thirty years almost 8,000 cases of these diseases, with a toll of 688 deaths from 53 epidemics, have been officially reported to health departments in Canada. Such figures, however, represent but a fraction of the number of illnesses occasioned by the drinking of infected milk. The data quoted were compiled this year by the late Mr. R. H. Murray, A.M.I.C.E., whose recent passing constituted a great loss to public health.

With all the emphasis which has been laid upon the necessity of safeguarding milk by inspection and pasteurization, one would expect that no large city in Canada would permit distribution of milk that may be a menace. In Mr. Murray's article in this issue it is shown that of 32 cities with a population of 20,000 and over, only 12 have 95 per cent or more of their milk pasteurized while 6 have 50 per cent or less of the supplies so protected. In almost all the smaller cities, towns and villages, the bulk of the milk distributed is unpasteurized. The need for action is evident.

There is, of course, a general recognition of the food value of milk. It is one of the cheapest foods and one of the best. From the standpoint of nutrition, health authorities can urge the consumption of much larger quantities of milk, for it is fair to say that less than half a pint a day per person is being used in Canada. They have refrained from doing so, however, because of the amount of raw milk which is being distributed. "Drink more milk" must be replaced by "Drink more milk—but drink *safe* milk".

Adequate supervision of dairy plants is essential if the label "pasteurized milk" is to mean "safe milk". Not only is it necessary that the equipment be efficient but such safeguards as recording thermometers should be employed. The practical application of the phosphatase test in the control of pasteurized milk is presented by Professor H. D. Kay in this issue. The test is designed to determine that milk has been properly pasteurized and is based on the knowledge that phosphatase, one of the enzymes present in milk, is entirely destroyed by heating to 145°F. for thirty minutes. The value of this test has been demonstrated during the past two years in England, where milk is pasteurized at that temperature, and its use in the control of the process has been adopted by many health departments.

# CURRENT PUBLIC HEALTH COMMENT

P. A. T. SNEATH, M.D., D.P.H.

Toronto

## HOUSING LEGISLATION IN GREAT BRITAIN

WE have no apologies to offer for continuing to bring the subject of housing before readers of this section, because it is a problem that should be thoroughly understood by public health authorities before they are committed to any particular viewpoint, and also because it is this branch of government that will doubtless be called upon to effect legislative enactments that deal with housing reform. Too often it would appear that our parliamentary representatives are presented with Bills drafted by enthusiasts from two schools of thought: those who "making the sky their limit", put forward impracticable ideas and will be satisfied if only a limited proportion of these are acceptable, and those who bring forward ideas of contemporary reform, with little knowledge of the past experience, that in consequence are continually requiring amendment. Both groups evidently fail to appreciate that before legislation is placed on the statutes, the past, present, and future effects of the ideas embodied therein ought to be carefully studied, and failing such, that however altruistic the motive may be, the subject with which they are concerned is emasculated or otherwise brought into contempt.

For these reasons it is proposed to review the vicissitudes through which the housing legislation of Great Britain has passed.

### *The Evolution of Housing Legislation in Great Britain*

Primitive man required housing chiefly as protection against the elements and to a more limited extent as deterrent to marauders. In the early pastoral state these were either caves or temporary structures occupied for short periods of time. With the

gradual changes in social status it will be realised that the problems associated with housing have arisen as a result of the grouping together of mankind either for purposes of mutual protection or gainful employment. These problems, it may be observed, are essentially those from which have been developed the principles that govern and affect sanitation.

The legislative experience in Great Britain shown herein gives evidence of three stages in the development of housing reform. The earliest period, 1580 to 1841, indicates the recognition of a need for the control of building and the housing accommodation of the labouring and dependent classes. It is manifest that such improvement, if any, resulted from uncoordinated voluntary effort which, from the turbulence, national, political and epidemiological, of a great part of that period, could not be of much significance.

The second stage, 1841 to 1924, marks the period of constructive experimentation, arising from the awakening of the British people to the social irregularities and massing of population incident to the rise of industrialism. The third and present stage of development, commencing with the Housing Act of 1925, may, for our purposes, be looked upon as that of consolidation, under which a central direction of effort appears to have been found necessary.

A closer analysis of the 1841-1924 period shows that such impetus towards bettering the housing conditions of that indefinite group, *the working classes*, was given by voluntary effort, later followed by various enactments with a similar purpose but without a complete understanding by the sponsors of the problems involved or

the most satisfactory methods of their solution. The former was exhaustively covered by a Royal Commission in 1884, following which legislation was promulgated which permitted local authorities to deal with their own problem, in so far as slum clearance and the provision of housing accommodation for the working classes were concerned. As experience developed it became clear that the owner-occupant of a house had a greater concern for the maintenance of his property than had a tenant, and to encourage ownership enabling authority was provided in order that municipalities might assist tenants in becoming owners of the house that they occupied. Furthermore, since the middle-class dwelling area of yesterday tends to become the slum area of to-morrow, the provision for town planning was the logical corollary as a means of avoiding or at least reducing in the future the overwhelming dislocation and costs incident to slum clearance undertakings. The soundness of principle of these various enactments was vitiated by the fact that there was no positive central direction and that the institution of action by local authorities along the lines of enabling legislation was left to such compulsion as developed from local public opinion, which opinion was bound to be influenced by the financial obligations entailed. The cataclysm of events during the war of 1914-1918 naturally arrested such scattered efforts as had been undertaken, and it became necessary that the government should afford means to prevent the financial exploitation of householders. In 1919 legislative compulsion was brought to bear upon local authorities in an effort to stimulate general action in the clearance of slum areas and construction of new houses, the latter being badly needed as a result of the stoppage of such construction during the war. The success of this being limited, the era of governmental subsidies directed towards fostering the housing program was instituted, the tendency of which

was to interest local authorities more in the competitive field as building agencies than in the improvement of housing conditions amongst the unremunerative slum dwellers.

Experience in the application then showed that the enactments and their amendments concerned with housing over this period of social evolution had become too complicated for interpretation. A revision of the statutes was made incorporating the existing legislation as the Housing Act of 1925 to initiate the stage of consolidation. This period which culminates with the Housing Act of 1935 probably is of too recent origin to be viewed in the proper perspective. One observes, however, a materialization of ideas born of experience whereby central guidance, discretionary compulsion and co-ordination of effort is provided with some common although "elastic" standard for the proper housing of the rural as well as urban labouring classes, together with the means by which co-operative planning for the future will be undertaken by local authorities.

With the discontinuance of new subsidies from the national Exchequer, a control over new housing is retained by local authorities as guarantors of loans to building societies, but they are now in a position to direct their efforts towards the clearance of slums, the housing of the dispossessed, and the prevention of slum conditions.

Have Canadians nothing to learn from this?

*Historical and Legislative Landmarks Affecting Housing in Great Britain*

1580. *Proclamation*. Forbidding new building in or within three miles of the gates of the City (of London).

1593. "Great mischiefs daily grow and increase by reason of pestering the houses, with divers families, harbouring of inmates and converting great houses into several tenements and erecting of new buildings in London and Westminster."

1601. *Poor Relief Act*. Provision

for building, upon waste or common land, convenient houses of dwelling for the impotent poor.

1603-1624. *Proclamations*. New proclamations relative to the foregoing, arising from which were various prosecutions.

1625-1649. Continued complaints without relief.

1661. *Proclamation*. To restrain "the exorbitant growth of new buildings in and about the city (of London) and for regulating the manner of all new buildings."

1666. The great fire of London, resulting in the destruction of 13,200 dwellings in addition to public buildings.

1667. *First Re-building Act*. Providing for wider streets, structural standards for houses, paving and cleansing of streets, and sewers.

1841, *Metropolitan Association for improving the dwellings of the Industrious Classes*. 1844, *Society for the Improvement of the Condition of the Labouring Classes*. Voluntary associations concerned with the provision of model lodgings at low rentals.

1851. *Common Lodging Houses Act*. Amongst other provisions permitted local authorities to arrange for lodging houses and common lodging houses.

1866. *Sanitary Act*. Amongst other provisions, regulations for the sanitary conditions of "tenements".

1875. *Public Health Act*. Allowing for repair or closure and demolition of single insanitary houses and the reconstruction of insanitary areas.

1884. Royal Commission to inquire into the housing of the working classes.

1885, *Housing of the Working Classes Act*. 1890, *Working Classes Dwellings Act*. Provided for slum clearance; repair, closure and demolition of single unfit houses; enabling local authorities to build and maintain houses for working class persons.

1899. *Small Dwellings Acquisition Act*. Permitting local authorities to advance money to a person residing

in a house to enable him to become its owner.

1909. *Housing, Town Planning, etc., Act*. Enabling local authorities to draw up town planning schemes for their areas.

1915. *Increase of Rent and Mortgage Interest (War Restrictions) Act*. Forbidding the increase of mortgage interest and rent over the charges in force August, 1914. (This was later amended to allow for rental increase up to 40 per cent provided landlords kept the property in repair.)

1919. *Housing, Town Planning, etc., Act. Housing (Additional Powers) Act*. An attempt to compel the action of local authorities in slum clearance and building of houses.

1921. *Housing Act*. Dealing with rates of interest on advances under Act of 1899.

1923. *Housing Act*. Providing a government subsidy of £6 per house for 20 years or a lump sum for new housing, and a grant not greater than 50 per cent of local authorities' annual loss on slum clearance.

1924. *Housing (Financial Provisions) Act*. Increasing subsidy to £9 per house for 40 years.

1925. *Housing Act*. Consolidation of existing legislation and provision of regulations.

1926. *Housing (Rural Workers) Act*. Reconstruction and improvement of buildings, etc., used for the housing of agricultural workers; reduction of the 1924 subsidy.

1930. *Housing Act*. Clearance and improvement of unhealthful areas, with provision of model by-laws for the prevention and abatement of overcrowding in such areas.

1931. *Housing (Rural Workers) Amendment Act*. Supplementing Act of 1926.

1932. *Town and Country Planning Act*. Repeal of previous planning legislation and authorization for the preparation of planning schemes by Sanitary Authorities, separately, conjointly or by relinquishment of their powers to the County Council. The Minister

was given discretionary authority to exercise compulsory powers in respect of the preparation of such schemes.

*1933. Housing (Financial Provisions) Act.* Ended government subsidies in respect of future building by local authorities. Local authorities and county councils are authorized to guarantee advances to building societies for the construction of new houses, thereby being enabled to direct their attentions to slum clearance and the rehousing of the dispossessed.

*1935. Housing Act.* Defining a national standard of accommodation and directing a housing survey by local authorities upon that basis, with the submission of recommendations of measures for improvement and redevelopment to the Minister, whose information will be supplemented by a Central Housing Advisory Committee; encouraging redevelopment and reconditioning by property owners, and requiring slum clearance and redevelopment of overcrowded working class areas by local authorities.

---

### **Resolution Adopted by the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association, June, 1936**

WHEREAS, at the annual meeting of the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association, held at St. Louis, Mo., February 25, 1936, a presentation was made by Joel I. Connolly, of the Chicago Board of Health, relating to possible health hazards in apparently modern plumbing installations in public buildings, and

WHEREAS, it was manifest in the said presentation that plumbing fixtures which have been generally regarded as safe and sanitary in design may in fact constitute a real and serious health hazard by reason of the danger of back siphonage and contamination of water supply mains, and

WHEREAS, the probability exists that such apparently modern, safe, and sanitary plumbing installations may exist in numerous school buildings in the United States, and

WHEREAS, the existence of such apparently safe, modern and sanitary plumbing installations and reliance upon them brings about a sense of false security, therefore, be it

RESOLVED, by the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association that this Committee apprehends the possibility of danger to the health of school children from apparently safe, modern, and sanitary plumbing installations in school buildings, and be it further

RESOLVED, that the said Joint Committee earnestly recommends to all school boards and school executives that surveys be instituted by competent engineers to ascertain whether or not the danger of back siphonage and consequent pollution of water supply mains exist in plumbing installations within their jurisdictions, and that such surveys be followed by prompt corrective measures.

## ASSOCIATION NEWS

### CHRISTMAS MEETING, LABORATORY SECTION

**T**WO important announcements have been made by the committee in charge of the Christmas meeting of the Laboratory Section, a meeting which is of special interest to bacteriologists and pathologists. The first is that Dr. R. E. Dyer, Surgeon of the United States Public Health Service and Assistant Director of the National Institute of Health, Washington, will be the guest speaker. The Association is indebted to Surgeon General Parran for making Dr. Dyer's visit possible. It is expected that Dr. Dyer will speak of his research studies in typhus and Rocky Mountain spotted fever. The second announcement is that the Editorial Board of the Journal has made arrangements for the printing in the January issue of abstracts of all the papers presented at this meeting. The need for the prompt publication of the papers has been recognized and the publication of the abstracts will be in accord with the practice of other scientific bodies.

The meeting promises to be attended by bacteriologists and pathologists from all parts of Canada. The sessions will be held in the Royal York Hotel, Toronto, on Monday afternoon and evening, December 21st, and Tuesday morning and afternoon.

### CERTIFICATION OF SANITARY INSPECTORS

**T**HE Central Board of Registration and Examination of the Committee on the Certification of Sanitary Inspectors has reported the results of the second annual examinations which were held on September 23rd, 24th and 25th in Vancouver, Edmonton, Toronto, Montreal, and Saint John. The examinations were written by forty-two candidates. The following are the candidates who have passed or have been conditioned in one subject. Candidates failing in one subject are

permitted to rewrite the paper at the next annual examination and must complete the work, including the oral examination, before the certificate is granted.

*Alberta:* Reginald Jackson, John C. Mooney, and John H. Reid.

*British Columbia:* Henry Blacklin, Reginald P. Devine, Vernon Enman, Joseph Fuller (*Sanitation*), Stanley W. George, Elwood S. Gropp, Sidney P. Heasman, Samuel C. Kinniston (*Sanitation*), George A. Rogers, Laurence E. Robertson (*Sanitation*), Robert Skinner, James K. Smith, Reginald Startup, and Henry G. Watts.

*New Brunswick:* Wm. Percy Keirstead.

*Ontario:* Ziba Bond, John L. Cavers, Harry Dennison (*Sanitation*), Albert J. Harrison, William S. Hill, Charles Ireson, Robert W. Kindred, Archibald P. Love, Donald McDonald (*Field Work*), John P. Mardall (*Communicable Diseases*), William D. Marson, Melville F. Matthews, Thomas G. Miller, Thomas Neill, William J. E. Osborne, Arthur E. Ruggles, Robert W. Ruggles, and Clare E. Wattam.

*Quebec:* Joseph A. Belanger.

Health departments throughout Canada are being reminded that after January 1, 1938, all candidates will be required to submit evidence of having completed a satisfactory secondary school education. Those now serving as sanitary inspectors who have not this educational qualification will be permitted to make application for the examinations which will be held in September, 1937. The committee is most anxious that sanitary inspectors desiring to write the examinations and who have not this educational requirement should know definitely of this ruling of the committee which was duly announced in the first issue of the regulations.

### ADDENDUM TO THE REPORT OF THE COMMITTEE ON ARCHIVES

**T**HE members of the committee have appreciated the interest manifested in this report, which they desire



to amend by supplementing and correcting the following items:

1. In listing the annual meetings together with the names of the presidents, the name of the late Dr. W. C. Laidlaw of Edmonton should have been given as president in 1923.

2. In addition to those listed as attending the organization meeting on October 12, 1910, the following were also present: Dr. L. M. Coulter,

Major Lorne Drum, M.D., Dr. E. B. Echlin, Dr. H. D. Johnson, and Dr. T. A. Starkey.

3. The committee regrets that the names of Dr. L. M. Coulter and Dr. Duncan M. Anderson were inadvertently omitted from the list of charter members. Both gentlemen were actively associated with the organization of the Association, being original incorporators under the Ontario Letters Patent issued on September 22, 1910.

### ROBERT HUTCHISON MURRAY, A.M.I.C.E.

**W**ORD of the death of Mr. R. H. Murray in Scotland on August 28th was received with deep regret by the wide circle of his friends in Canada. Although his return to Scotland was part of a period of absence designed to restore him to health, the seriousness of his illness had not been fully appreciated.

Mr. Murray was born in Glasgow in 1886 and attended Glasgow High School and the Royal Technical College. Later he graduated from the University of London and became a Chartered Civil Engineer of Great Britain. From 1905 to 1910 he was employed as civil engineer on the Glasgow Main Drainage Scheme and subsequently by the Department of Public Works, Toronto. With this background of experience in municipal engineering, Mr. Murray became associated with the Department of Public Health of Saskatchewan in September, 1912, and joined with the late Dr. M. M. Seymour, Commissioner of Health for the Province, in carrying forward an active program of sanitation. Shortly after the commencement of the war he proceeded to London and joined the Second London Sanitary Company, R.M.C., as Officer Commanding of the 88th Sanitary Section, serving in succeeding years in Egypt, France, and England. Mr. Murray returned to Regina in June, 1919, and with the creation of the Division of Sanitation in the Department of Public Health of

Saskatchewan in 1920 he was appointed Director, assuming at the same time responsibilities under the Union Hospital Act which in 1919 provided for rural hospitals throughout the province.

Since 1911 Mr. Murray had been an associate member of the Institution of Civil Engineers of Great Britain and an associate member of the Engineering Institute of Canada. He was also active in the formation of the Saskatchewan Health Officials' Association and was Secretary-Treasurer from its inception. Mr. Murray was one of the first in Canada to recognize the role of the sanitary engineer in milk control. Taking advantage of every opportunity to safeguard municipal supplies, he assisted in laying the foundations for adequate milk control not only in Saskatchewan but throughout Canada. As Vice-chairman of the Committee on Safe Milk of the Canadian Public Health Association, he made many valuable contributions in the technical aspects of safeguarding milk. At the time of his death he was also Vice-chairman of the Public Health Engineering Section of the Association. In his passing the Province of Saskatchewan, the Saskatchewan Health Officials' Association, the Canadian Public Health Association, and the cause of public health in Canada have suffered a great loss.

## BOOKS AND REPORTS

### **The Bacteriology of Typhoid, Salmonella and Dysentery Infections, and Carrier States.**

*Leon C. Havens, M.D., Director of Laboratories, Alabama Department of Public Health. Published by the Commonwealth Fund, New York, and the Oxford University Press, London, England, 1935. 158 pages. \$1.75.*

This excellent little book is a concise practical description of laboratory observations of the author who contributed generously to the present knowledge of these common enteric diseases. Unfortunately Dr. Havens's death occurred before the manuscript was completed but his lifelong friend, Dr. Kenneth Maxcy, Professor of Preventive Medicine and Bacteriology at the University of Virginia, prepared the work for publication. The important scientific contributions which Dr. Havens made are so well known that no further reference to his work need be made. He appreciated the value of the interrelationship between laboratory and field investigations and enthusiastically carried out important scientific research. To the laboratory worker and busy technician the book will be very valuable for the author presents the standard techniques and procedures that will be found most useful and accurate.

The first chapters summarize present knowledge on the antigenic composition of bacteria and bacterial variation and describe the preparation and preservation of the common culture media with hints which make for greater success in the isolation of these intestinal pathogens. Stress is laid on serological tests as the final and sure methods of identifying these organisms. The chapters on the *Salmonella* group clearly emphasize many important points about this intricate family of so-called "food-poisoning" organisms. Dr. Havens reviews the typhoid-carrier problem, presenting valuable original epidem-

iological findings with a discussion of the important aspects of this problem in its relation to typhoid control. One wishes that this discussion had been more extended.

The volume is highly recommended for teaching because of the concise, clear, up-to-date presentation. Like all the publications of the Commonwealth Fund, the printing and tables are highly creditable and the price of the volume most attractive.

*K. F. Brandon*

### **Principles and Practice of Recreational Therapy for the Mentally Ill.**

*John Eiselle Davis, B.A., M.A., in collaboration with Dr. William Rush Dunton, Jr. A. S. Barnes and Company, 67 West 44th Street, New York City, 1936. 206 pages. \$3.00.*

This book deals with the various types of recreation used in the treatment of the mentally ill. In the term "recreation" the author includes games, concerts, formal and informal exercises. Recreational therapy is usually considered as a subdivision of occupational therapy and the basic principle in both of these is to interest the patient in something other than his disturbed thoughts and ideas, and so to help him in the restoration of his mental health.

In the first chapter the author gives a general discussion of the various groups of mental disorders and mentions the types of play found most useful in each case. He covers in detail such problems as obtaining and keeping the patient's interest, and the various types of games and the tests used so that one can properly fit the complexity of the game to the mental ability of the patient. In the final chapter the author indicates that the primary purpose in this work is not to teach mental patients types of recreation but to use these as a means of improving their behaviour so that they may again take their place in the community.

In this volume Dr. Davis has included material drawn from a wide field of reference and has combined these with his widespread experience. The book should prove of distinct value to persons engaged in the fields of occupational and recreational therapy in mental hospitals.

G. E. Hobbs

**Clinical Miscellany.** *The Mary Imogene Bassett Hospital, Coopers-town, New York. Volume II. Contributors: Drs. F. F. Harrison, C. C. McCoy, M. A. McIver, G. M. Mackenzie, M. F. Murray, R. M. Pike, J. H. Powers, D. K. Scheidell and R. C. Tanzer. Published by Charles C. Thomas, 300 East Monroe Street, Springfield, Ill., 1935. 218 pages. \$3.00.*

A wide variety of clinical conditions is gathered together for presentation in this book. Some of these might be considered rare and most are at least unusual conditions. The subject matter is treated in a very able manner and one is impressed with the thoroughness with which the cases have been investigated and the pains taken to analyse the clinical and laboratory data.

The choice of topics might have been a happier one from the point of view of the practising physician. There can be little doubt that his interest will be limited to but one or two of the topics dealt with. It is certainly worth while, however, to have pointed out that gall bladder disease *does* occur in childhood and that Hodgkins' disease is sometimes permanently cured.

F. O. Wishart

**Nutrition Considered in Relation to Public Health and to Economic Conditions.** *League of Nations, Information Section, Geneva, 1935. 24 pages.*

Recognizing that adequate nutrition is most desirable from a public health viewpoint and that politically it has the advantage of making people contented, this report considers the paradoxical situation that there is

undernutrition in many countries and overproduction of foodstuffs in others. Farmers are urged by governments to restrict production, and other artificial means are employed in attempts to increase prices. All such measures are somewhat futile and tend to increase undernutrition. This report urges that governments give thought to means of making foods readily available to poor people and suggests that subsidies might be well used for this purpose. An increase in food consumption, especially of protective foods (milk, eggs, fruits and vegetables), would be of advantage from a health viewpoint and would definitely improve the economic condition of farmers. The report is well written and should cause consideration of a major problem.

E. W. McHenry

#### **Health Organization Report on the Physiological Bases of Nutrition.**

*Compiled by the Technical Commission appointed by the Health Committee, League of Nations, Geneva, 1933. 19 pages. Official number: C.H. 1917.*

This is a report from a committee of twelve internationally known experts in nutrition and is, essentially, a condensed summary of a lengthy and valuable review of nutrition by Drs. Burnet and Aykroyd. Both reports can be most highly commended. The brief report contains a summary of our present knowledge of adequate diets for normal individuals and the statements are such as can be accepted without controversy. Every person interested in nutrition, particularly those concerned with public health work, should have and should read this report. A series of nine problems is suggested for further study. All of these, particularly the assessment of the nutritional state of children and the extent to which diets in common use fall below the recommended standards, deserve investigation in Canada. The reading of this report may stimulate such action.

E. W. McHenry

## CURRENT HEALTH LITERATURE

*These abstracts are intended to direct attention to articles that have appeared in other journals during the past month. Any of the journals referred to may be borrowed for three days or longer if desired. Address requests to the secretary of the Editorial Board.*

### **Mortality of New-Borns in Chicago**

This study was an intensive field investigation of the death of every infant under 30 days with the object of further decreasing the infant mortality in Chicago. A questionnaire covering 68 items on pre- and post-natal care and delivery was prepared.

In 1935 there were 1,361 deaths of infants under 30 days of age. Of these 58.4 per cent were premature. It was thus obvious that the care of premature infants was most important and hospitals were urged to provide proper facilities and equipment. In some cases "premature" nurseries were set up. Notification by telephone of a premature birth and confirmation by writing within 24 hours were required. This notification was answered by immediately sending a nurse to the home to assist the physician and, where necessary, hospitalization was carried out. It was found that antepartum care was inadequate in half the premature deaths, pathologic conditions going unrecognized and untreated. The most common pathologic conditions in mothers associated with premature deaths were toxæmia, external injury, placenta prævia, syphilis and other infections. The importance of a Wasserman reaction on the mother is stressed. The mortality for premature infants in the first 24 hours was almost double that for full-term infants. In 1935 there were 37.7 premature births per 1,000 live births. Of these 42.7 per cent died within the first month. The most frequent causes of death associated with prematurity were atelectasis, cerebral hemorrhage, malformations and bronchopneumonia. Better methods of resuscitation are advocated. The first step should be

the use of a tracheal catheter for the removal of mucus. The study illustrates the great care necessary in the use of analgesics, oxytoxics and anaesthetics especially in the case of prematures who are easily affected by such drugs.

The mortality rates in various institutions show the advantage of caring for premature infants in specially equipped nurseries under the supervision of an expert personnel.

H. N. Bundesen, O. A. Dahms, W. I. Fishbein, and G. E. Harmon, J.A.M.A., 1936, 107: 270.

### **The Incidence of Neutralizing Antibodies for Human Influenza Virus in the Serum of Humans**

One hundred and thirty-six human sera were tested for their power to protect mice against a strain of human influenza virus. The results indicated that neutralizing antibodies were present in a very high proportion of sera at all ages except during the period between the end of the first month of life and the end of the first year. The sera of all 11 new-borns contained protective antibodies. The majority of children aged 1 to 10 had neutralizing antibodies in their sera, indicating that natural immunization against human influenza virus has been occurring freely during the past ten years.

T. Francis, Jr., and T. P. Magill, J. Exper. Med., 1936, 63: 655.

These sera were also examined for neutralizing antibodies for swine influenza virus. The majority of the adult sera and new-born infants' sera contained neutralizing antibodies for the swine virus but very few children under 12 had protective antibodies against the latter virus. Therefore it appears that few infections with this virus have occurred during recent years. These results support the view previously advanced by Laidlaw, as a result of tests done in England in 1935, that the swine influenza virus may represent the type of virus that caused the pandemic of 1918.

R. E. Shope, J. Exper. Med., 1936, 63: 669.

